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AMERICAN PUBLISHER'S NOTICE.

THIS work, although based upon Chambers's Encyclopædia, whose distinguished merit is widely known, differs from it in important respects. It could scarcely be expected that an Encyclopædia, edited and published for a foreign market, would give as much prominence to American topics as American readers might desire. To supply these and other deficiencies the American Editors have inserted about 15,000 titles, arranging the whole, including Chambers's Supplement, in a single alphabet. The total number of titles is now about 40,000. The additions give greater fullness in the departments of biography, geography, history, natural history, and general and applied science. Scrupulous care has been taken not to mutilate or modify the original text of the edition of 1880; no changes have been made except such verbal alterations as are required by the omission of the wood-cuts. The titles of articles from Chambers's Encyclopædia, either from the main work or from the Supplement, are printed in bold-faced type—**AMERICA.** The titles of the American additions, whether of new topics or of enlargements of the old, are printed in plain capitals—AMERICA. Should it appear that an article from the English work and its American continuation disagree in any points, the reader will readily refer the conflicting statements to their proper sources.

The labor of consultation will be much reduced by the catch-words in bold-faced type at the top of the page, being the first and last titles of the pages which face each other; and by the full title-words on the back of the volume, being the first and last titles contained therein.

The word *ante* refers to Chambers's Encyclopædia, as represented in this issue. Whenever the word (*ante*) follows a title in the American additions, it indicates that the article is an enlargement of one under the same title in Chambers's Encyclopædia—usually to be found immediately preceding.

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DISRAELI, BENJAMIN, Earl of BEACONSFIELD, author and statesman, eldest son of ISAAC, was b. in London, 1805; he received a private education, which was carefully superintended by his father. At the age when most other young men who rise to political distinction are sent to a university, he was articled to a solicitor, with a view of qualifying him for a situation in a government office, which had been obtained for him by his father. The drudgery of a lawyer's office being distasteful to him, he contributed to a tory journal, the *Representative*, which came to an untimely end. In 1827, he published his novel *Vivian Grey*, which was succeeded at intervals by other brilliant works of fiction, including *The Young Duke; Contarini Fleming; The Wondrous Tale of Alroy;* and *Henrietta Temple.* He also wrote *The Rise of Iskander; A Vindication of the British Constitution;* and *The Revolutionary Epic.* After visiting Italy, Greece, Turkey, and Syria, he returned to England, to find the country involved in the reform bill agitation. His sympathies appear now to have inclined to radicalism in politics; and having obtained recommendations from Mr. Hume and Mr. O'Connell, he presented himself in 1832 to the electors of Wycombe, but was defeated. At the general election in 1835, he met with no better success. In April in the same year, he contested Taunton on conservative principles, but again without success. In 1837, his desire for a political career being unabated, he contested Maidstone in the conservative interest along with Mr. Wyndham Lewis. He was elected, and at the age of 32 took his seat in the house of commons. His maiden speech, which was in a high-flown style, and delivered with extravagant gestures, excited the laughter of the house of commons. He was so much disconcerted, that he stopped short abruptly, but not without uttering the remarkable prophecy: "I shall sit down now, but the time will come when you will hear me." In 1838, Mr. W. Lewis died, and in the following year D. married the widow of his late colleague. He then carefully studied the style of successful parliamentary orators, making few speeches. It was not till 1849 that he began to attract notice, and not long afterwards he gained the ear of the house as the leader of the Young England party. After entering parliament, D. wrote several novels—*Coningsby* (1844); *Sybil* (1845); and *Tancred* (1847), in which the principles of Young England are most ingeniously blended with theories about the intellectual supremacy of the Jews, inaccurate scientific notions, and misconceptions of English social life. At the general election in 1841, he obtained a seat for Shrewsbury. He then became the organ of the dissatisfaction with which the landed aristocracy and country gentry regarded sir Robert Peel's relaxations of the system of protection to native industry. His brilliant invective and polished sarcasm inspired the protectionist party with fallacious hope and confidence. On the death of lord George Bentinck in 1848, D. succeeded to the leadership of the protectionist party in the commons. He bore generous testimony to the political consistency and private worth of his predecessor in his *Lord George Bentinck, a Biography.* In 1852, the earl of Derby, having undertaken the construction of a cabinet, offered him the post of chancellor of the exchequer. It was the first time a brilliant novelist had ever figured as the finance minister of a great commercial state, and it argues well for the versatility of his genius that he emerged with honor and credit from the ordeal. His second budget, in 1853, failed, however, to find acceptance with the house of commons, and the government being outvoted upon it, the Derby cabinet ceased to exist. D. resumed the leadership of the opposition, from which he was again summoned in 1858, to fill the post of chancellor of the exchequer in the second administration of lord Derby. In 1859, he introduced a measure of parliamentary reform, which, being thrown out, was followed by the resignation of the government. For seven years the liberals remained in power, and Mr. Disraeli, in opposition, displayed talents as a debater, and a spirit and persistency under defeat, which won for him the admiration of his opponents. When lord Derby returned to power in July, 1866, D. again returned to the post of chancellor of the exchequer. It was he chiefly who induced the conservative party to pass the reform bill of 1867, his argument being, that the working-class householders are more conservative than those to whom the franchise had been previously extended. In Feb., 1868, D. succeeded lord Derby as

premier, but, in the face of a hostile majority, he resigned in the following Dec. On this occasion, Mrs. Disraeli, in acknowledgment of her husband's services, was raised to the peerage as viscountess Beaconsfield (died 1872). In 1870, D. published another novel, *Lothair*, marked by most of the merits and defects of those which preceded it. In 1873, the popularity of Mr. Gladstone subsided, and the election of 1874 giving the conservatives a large majority, D. returned to power as prime-minister. In 1877, D. took his seat in the upper house as earl of Beaconsfield. Still premier, the earl was the guiding spirit of his cabinet during the critical years 1877–78, seeking by energetic action in eastern affairs to give an "imperial" character to English policy; and he returned from the congress of Berlin bringing, as he said, "peace with honor." He is LL.D. of Edinburgh, D.C.L. of Oxford, has twice been lord rector of Glasgow university, and holds many other honorary offices and titles.

DISRAE'LI, ISAAC, D.C.L., a well-known English author, was the descendant of a Hebrew family which flourished first in Spain, and afterwards in Italy. His father, Benjamin D'Israeli, came to England in 1748, entered into business in London, amassed a fortune while yet in middle life, and retiring to Enfield, there died in 1817, aged 90. His son Isaac, born at Enfield in 1766, was educated at Amsterdam and Leyden. He commenced his career as a poet and novelist; but, after the publication of the first volume of his *Curiosities of Literature* (1791), he discovered that his forte lay not in creative literature, but in the illustration of history and literary character, and to this he devoted himself. His style is elegant and pleasing, presenting the fruits of antiquarian research and study without their dryness and general want of connection. No writer is more instructively amusing or amusingly instructive than he. Lord Byron speaks of him as "that most entertaining and searching writer." D. died in 1848.

D.'s principal works are the *Curiosities of Literature* (1791–1823; new edition, with Life, Lond. 1851); *A Dissertation on Anecdotes* (1793); *Essay on the Manners and Genius of the Literary Character* (1795, 14th ed., 1850); *Inquiry into the Literary and Political Character of King James I.* (1816); *Commentaries on the Life and Reign of Charles I.* (1828–31); *Eliot, Hampden, and Pym* (1832); *Amenities of Literature* (1841)—for which he received from the university of Oxford the honor of D.C.L.

DISRUPTION, the name generally given in Scotland to the famous act of 1843, by which upwards of 400 ministers of the church of Scotland (nearly two fifths of the whole) left their churches and manses to vindicate principles which they conceived to be essential to the purity of that church, and in harmony with its earlier history. The word D. was probably chosen to indicate that these ministers did not look on their act as a *secession* or *dissent* from the church of Scotland, but as a *split* or *division* within it, and the body immediately after formed by them assumed the name of the free church of Scotland. See FREE CHURCH.

DISS, a market-town of the co. of Norfolk, England, on the right bank of the Wavency, 19 m. s.s.w. from Norwich. It is a station on the Great Eastern railway. The town stands on the slope of a hill; its streets are narrow, but many of the houses very good. There are brush manufactories and breweries. The church of St. Mary is a large and handsome Gothic building. Pop. '71, 3,851.

DISSECTION. See ANATOMY, in Law.

DISSECTION WOUNDS. The practical study of anatomy is attended with certain dangers, which, however, during the last quarter of a century have been much lessened. The atmosphere of the dissecting-room, now comparatively pure by the application of proper ventilation and other sanitary measures, was, less than a generation ago, too commonly loaded with noxious emanations, which more or less poisoned the blood of those who continuously inhaled it, and consequently produced nausea, sickness, diarrhea, a bad taste in the mouth, and other symptoms. D. W., which are always attended with a certain amount of risk, were rendered more dangerous by the low state of the system, induced by the depressing influence of the surrounding air. Now, probably in consequence partly of the purer air, and partly of the general and extensive use of antiseptic injections into the vessels of the subjects to be dissected, it rarely happens that severe symptoms follow a cut or puncture. We may incidentally remark that a puncture in making a post-mortem examination, when the body is comparatively fresh, is much more likely to be followed by serious consequences than a wound in the dissecting-room in which the bodies have been lying for some weeks.

In the great majority of cases, punctures or cuts in the dissecting-room are followed by no unpleasant results; it being an established rule, that every puncture should be carefully sucked as soon as it is observed, and then freely touched with nitrate of silver. When, however, the poison has been absorbed, and is going to act, the patient begins to have a feeling of general illness in less than 24 hours. He is low-spirited, faint, and chilly, and often complains of nausea. Then come rigors, intense headache, rapid and sharp (but weak) pulse, a coated tongue, vomiting (sometimes), and great restlessness. The first local symptom is intense pain in the shoulder of the wounded side, which is followed by fullness of the neck and armpit, extending in the form of a doughy swelling down the side of the trunk, and assuming a pinkish tint.

The general symptoms increase in severity, the breathing becoming difficult, the

pulse very rapid and weaker, the tongue dry, brown, and often tremulous when protruded, and the skin more or less yellow. The case may terminate fatally at or before this stage; or abscesses may continue to form, from which the patient may more slowly sink; or if he survive, the arm may remain stiff and useless, or some of the fingers may be destroyed by gangrene. In the article POISONS we have noticed the rapidity with which death occasionally ensues in these cases. The essential points of treatment are briefly summed up as follows by Dr. Druitt in his excellent remarks on this subject in *The Surgeon's Vademecum:* "The indications clearly are to eliminate the poison from the blood; to support the strength; and to relieve pain, and promote the discharge of pus or sloughs." The treatment, both general and local, is, however, so similar to that of pyæmia, that it is sufficient to refer our readers to that article.

As a precautionary measure in post-mortem examinations, the surgeon, especially if he be out of health, or if the patient have died from a disease of an erysipelatous character, should thoroughly anoint his hands with lard. Very thin india-rubber gloves have been recommended as a safeguard to dissectors; but they have not been found to answer; probably from the constraint to which they subject the action of the fingers.

DISSEISIN. See SEISIN.

DISSENTERS, the common appellation of those who dissent or differ from the established church of their country in any of its doctrines, or in any part of its constitution, and therefore separate themselves from it. Although sometimes employed as a sufficiently appropriate designation of the sects which separated themselves from the general body of the church during the early and middle ages, the term D. belongs to modern times and Protestant countries; the claims of the Roman Catholic church, where dominant, having always been asserted in a manner incompatible with the existence of recognized religious dissent. The measure in which the rights of D. are conceded by law, may be esteemed a fair test of the religious liberty enjoyed in a country, and of the general enlightenment of a people. The term D. is of English origin and growth, although its almost exact equivalent may be said to have existed in Poland in the name *dissidents*, a term which first appears in the acts of the Warsaw confederation of 1573, and there denotes the Polish Protestants, in contradistinction to the members of the established Catholic religion. After 1632, the term dissidents was applied in Poland to all who were not Roman Catholics, such as Lutherans, Calvinists, Greeks, Armenians, etc.

In England, the term D. appears to have come into use in the 17th c., as synonymous with *nonconformists;* and from England its use was transferred to Scotland in the 18th c., after the Secession (q.v.) church had been founded in that country. It is usually applied to those who agree with the established church in the most essential doctrines, but differ from it on some minor point, or on questions of church-government, relation to the state, rites, etc., as in England to Presbyterians, Independents, and Baptists. The claim of the church of Rome to be regarded as the *Catholic* church prevents its members from accepting the name D., and others seldom seek to apply it to them. On somewhat similar grounds, it is rejected by *Episcopalians* in Scotland; and for very different reasons, to be found in the peculiar circumstances which attended their growth, the *Methodist* (q.v.) churches are seldom included in it, as ordinarily used. See ESTABLISHED CHURCH, NONCONFORMISTS, PURITANS, UNITED PRESBYTERIAN CHURCH, TOLERATION, etc.

The term D. is not strictly legal or ecclesiastical, those to whom it applies being usually described in legal language by a periphrasis. It may be said to be a convenient term to designate those Protestant denominations which have dissented from the doctrine and practice of the church as by law established. Immediately after the reformation, D., or nonconformists, as they were then called, were subjected to severe restrictions and penalties. "During the rebellion, the laws against Protestant sectaries were repealed: but they revived at the restoration; and the parliament of Charles II. proceeded to enforce systematically, by new measures of vigor, the principle of universal conformity to the established church."—Stephen's *Com.*, iii. 53. By 1 Will. and Mary, c. 18, the restrictions on D. were first relaxed, and certain denominations were suffered to exercise their own religious observances. From that period, various statutes have been passed, each extending in some degree the free exercise of religious opinion. At the present time, D. of all denominations are allowed to practice without restraint their own system of religious worship and discipline. They are entitled to their own places of worship, and to maintain schools for instruction in their own opinions. They are also permitted, in their character as householders, to sit and vote in the parish vestries. A dissenter, if a patron of a church, may also exercise his own judgment in appointing a clergyman of the church of England to a vacant living. See on this subject, Stephen's *Eccles. Law.*

A similar amount of religious liberty is enjoyed in Scotland, not so much derived from or guarded by special statute; fully recognized, however, by decisions of courts, as belonging to the law of the country.

Since the beginning of the 18th c., the Presbyterian, Independent or Congregationalist, and Baptist denominations in England, have been associated under the name of the *Three Denominations.* This association was fully organized in 1727, and enjoys—like the established clergy of London and the two great universities—the remarkable privi-

lege of approaching the sovereign on the throne. Notwithstanding much weakness, arising from doctrinal and other differences, this association has contributed much to promote toleration and religious liberty in England.

DISSEPIMENT (Lat. *dissepio*, I separate), in botany, the partition between two carpels (q.v.) in an ovary or fruit composed of a number of carpels. A D. is formed by the union of the sides of two carpels. Sometimes dissepiments meet in the center or axis, completely dividing the ovary or fruit into cells; sometimes they are partial, appearing as mere projections from the outer walls of the ovary or fruit, and leaving it one-celled. Many ovaries and fruits exhibit partitions not formed by the union of the sides of carpels; these are sometimes called *spurious dissepiments*.

DISSOCIATION, or DISASSOCIATION, a word belonging to the nomenclature of chemistry, first adopted by Henry St. Clair Deville to express the influence of heat in the decomposition of compound bodies. In a paper presented to the French institute, 1857, he says that "by selecting a proper compound and heating it sufficiently, the distance between the molecules can be increased to such extent that they will separate into their elementary conditions." He holds that water may be thus dissociated into its constituent elements at the temperature of melted silver. Deville placed a tube of porous porcelain within a tube of glass, and provided each with a separate outlet. He passed hydrogen through the inner tube, and carbonic acid through the annular space; both the gases passed through the pores of the septum, and a combustible gas issued from the carbonic acid tube. Thus far the experiment was not new. He now placed the tubes in a furnace heated to between 1000° and 1300° C., and substituted steam for the hydrogen of the inner tube. Part of the steam was decomposed, the hydrogen passing through the porous matter to the outer tube, and a corresponding portion of carbonic acid entering the inner tube by the same route. Some hydroden was lost by combining with oxygen of the carbonic acid, $CO_2 + H_2$ yielding $CO + H_2O$. From the inner tube came steam, carbonic acid, and oxygen, from which the oxygen was easily isolated; from the outer tube came steam, carbonic acid, carbonic oxide, and hydrogen, from which the hydrogen was also isolated. If the carbonic acid of the process were derived from the furnace which furnished the heat, and the steam were generated by the same heat, there results from the heating of water in this apparatus a certain quantity of separated oxygen and hydrogen, which might be used for the production of light and heat. By a modification of this process, sulphurous acid was separated, at 1200° C., into sulphur and anhydrous sulphuric acid; hydrochloric acid into hydrogen and chlorine; carbonic oxide into carbon and carbonic acid; and carbonic acid into carbonic oxide and oxygen. The economic value of this discovery is yet a problem. Lamy has applied it to the preparation of a pyrometer for showing high temperatures.

DISSOLUTION OF MARRIAGE. See DIVORCE.

DISSOLVING VIEWS are pictures painted upon glass, and made to appear of great size and with great distinctness upon a wall by means of a magic lantern with strong lenses and an intense oxyhydrogen light, and then—by removal of the glass from the focus, and gradual increase of its distance—apparently dissolved into a haze, through which a second picture is made to appear by means of a second slide, at first with a feeble, and afterwards with a strong light. Subjects are chosen to which such an optical illusion is adapted, such as representations of the same object or landscape at different periods. Dissolving views were invented and first exhibited as a popular entertainment in England.

DIS'SONANCE is the opposite of consonance, and is applied to those intervals in music whose relative proportions are to a certain extent unsatisfactory to the ear, and produce a degree of disquietude. In a special sense, the term dissonance is applied to the interval causing the unpleasant effect; which sound is not always, as some think, the upper note, but may be the middle or the lowest note. Many believe that the feeling of dissatisfaction produced by the dissonances of music, arises from the mind not being able without difficulty to comprehend at once the arithmetical proportions of the vibrations. The foundation of dissonance, however, is generally allowed to be more æsthetical than intellectual, as through the vibrations of a sounding body the air is put into a similar state of vibration, which is communicated to our ear, and so to our whole nervous system, through which we obtain the inward feeling representing the sound. In music, dissonance may be called a necessary æsthetical evil, which is used in the finest musical works for the purpose of producing pleasing contrasts, with their resolutions. In modern music, dissonance is divided into *essential* and *accidental;* the former arising fundamentally, the latter arising from passing notes, anticipations, suspensions, etc. See HARMONY.

DISTAFF, the staff on which the flax or wool is fastened, and from which the thread is drawn in spinning. A distaff of a very elegant construction is represented in art, and was no doubt generally used in antiquity. It is made of a cane-stick, the top of which is slit in such a manner as that the portions, when bent downwards, form a receptacle for the flax or wool. A ring was put over the top, for the purpose of keeping the divided ends of the cane together. The distaff was dedicated to Pallas; and the Fates are always represented with it, and engaged in spinning the thread of life. It has ever

been considered as the peculiar emblem of feminine as opposed to male occupations, and has come to be used figuratively for a woman.

DISTANCE. The limit of view in a picture, or *point* of *distance*, as it is called in perspective, is that portion of the picture where the visual rays meet; the *middle distance* being the central portion between the extreme distance and the foreground. The art of producing on the eye the effect of real distance, in so far as it is not accomplished by mere mechanical rules, is one of the most subtle branches of landscape-painting, and cannot be acquired otherwise than by long experience, and a careful study of the effects of light and shade.

DISTEMPER (Fr. *détrempè*), a coarse mode of painting, in which the colors—of a commoner kind than those usually employed for artistic purposes—are mixed in a watery glue, such as size and whiting. The chief purposes for which distemper is now used are scene-painting and staining-papers for walls. But it is known that the old masters frequently executed pictures and portions of pictures in distemper, and then oiled them, by which means they acquired the character of being painted originally in oil. It is said that Paul Veronese sometimes began his pictures in distemper, and finished them in oil, and that he frequently painted his skies in distemper. Distemper is often ignorantly supposed to be identical with fresco (q.v.). The difference is, that whilst in the former the colors are laid on a dry surface, in the latter they are put on wet mortar or plaster. See GELATINE.

DISTEMPER is a typhoid inflammation affecting the upper air-passages of young dogs, and resembling in many respects the strangles of young horses, and the scarlatina and other such complaints of children. Like these, it is generally contagious, occurs only once in a lifetime, runs a definite course, is accompanied by low fever and debility, and is most successfully treated by good nursing and attention to diet and regimen. The eyes are red, weak and watery; the nose dry and hot; draughts of air or movements of the animal readily excite sneezing or cough; there is dullness, fever, and loss of appetite. The thickened slimy mucus which the inflamed membrane, after some days, secretes, accumulates about the eyes and nostrils, and lodging in the bronchial tubes, prevents the free access of air, and the proper purification of the blood. Hence ensue distressed breathing, increasing weakness, and symptoms of nervous disturbance, such as staggering gait, chorea (q.v.), and fits. All dogs are liable to distemper, but the delicate, highly bred, and artificially treated varieties suffer most severely, and amongst them the mortality is very great. Bleeding, physicking, and all irritating and reducing remedies, must be carefully avoided, and a good dry bed in a comfortable airy place provided. The stomach, which is generally overloaded, should be relieved of its contents by an emetic, which, for an ordinary-sized English terrier, may consist of two grains each of tartar emetic and ipecacuanha, with eight or ten grains of common salt, given in a wine-glassful of tepid water. If no effect is produced, the dose must be repeated in twenty minutes. Constipation, if present, should be corrected by half an ounce each of castor and olive oil, to which, in large dogs, a few grains of gray powder is a useful addition. The febrile symptoms, if acute, may be alleviated by giving four times daily, in cold water, two drops of tincture of aconite, and five grains each of niter and extract of belladonna. Distressed breathing will be relieved by applying to the chest and sides, for an hour or two continuously, a thick flannel cloth, wrung at short intervals out of hot water. The throat may also be rubbed with hartshorn and oil, and the nostrils sponged and steamed occasionally. Give frequently, and in small quantities at a time, milk and bread, or any other such simple and digestible food; and when recovery is tardy, and weakness ensues, endeavor by nursing, tonics (q.v.), and stimulants (q.v.) to support the strength.

The term D. is sometimes applied to influenza (q.v.) in horses, and epizootic pleuro-pneumonia (q.v.) in cattle.

DISTICH (Gr. *distichos*, consisting of two rows or ranks) is the classical name given to any two lines, but especially to a hexameter and pentameter, making complete sense. It was much used by the Greeks and Romans as a vehicle for the expression of single thoughts and sentiments; and hence became almost exclusively employed for the classical epigram. The great poets of modern Germany, Goethe, Schiller, etc., have also shown a fondness for the D., and remarkable skill in the use of it. A collection of moral maxims in Latin, ascribed to a certain Cato, Dionysius (q.v.), are called *Disticha*, and were highly popular during the middle ages.

DISTILLA'TION is an important process in the arts. It consists essentially in converting a liquid into vapor in a close vessel, by means of heat, and then conveying the vapor into another cool vessel, where it is condensed again into a liquid. When applied to a solid, the process is called *sublimation*. The object of D. is to separate one substance from others with which it may be mixed. In D. proper, no chemical decomposition takes place; when any of the substances are decomposed, it is called destructive D. (q.v.). The possibility of separating substances by vaporizing them, depends upon the fact that very few substances are volatile at the same temperature. Thus, water boils or becomes rapidly converted into vapor at 212°, alcohol at 173°, sulphuric ether at 94.8, while oil of turpentine must be raised to 318°, and mercury to 662°; and some sub-

stances, again, are altogether *fixed*. By applying the proper degree of heat, then, *and no more*, the more volatile of two substances may be expelled from the less volatile; and supposing the vapors of the two to rise mixed, as they are gradually cooled, that of the less volatile will be condensed before the other, thus affording another opportunity of separation.

It is often, however, not so easy to obtain a perfectly pure product by distillation as might at first appear, owing to another fact in chemistry—namely, that many bodies which, when pure, require a high temperature to vaporize them, become more easily vaporized when mixed with substances more volatile than themselves. Owing to this, it is impossible to obtain, by D. alone, alcohol perfectly free from water. The circumstance, on the other hand, is sometimes turned to good account in another way. By distilling, for instance, parts of plants with water, the essential oils pass over with the steam, and are then separated from the condensed water by other processes.

The applications of D. are numerous both in chemistry and in the practical arts. Pure water is obtained by D., the most of the substances dissolved in natural waters being fixed. Sea-water may thus be rendered drinkable, and there are apparatus for the special purpose. But wherever there are cooking-utensils, a distilling apparatus might be improvised. The pure water that descends from the clouds is produced in a way which is just the process we are speaking of on a large scale. See EVAPORATION. It is no figure of speech to say that the dews are "distilled."

The extraction of zinc from the ore is a distillation; the metal, when reduced, passes over in vapor, and is condensed in a separate vessel. When the zinc ore contains cadmium, this metal, being more volatile, comes over in the first portions, and may be removed. When mercury is used to extract particles of gold from sand, the mercury is distilled off from the amalgam, leaving the gold, which is fixed. The mercury being condensed, is again ready for use.

The most extensive application of distillation is in the manufacture of intoxicating spirits, and in ordinary language this is the most common use of the word. Strictly speaking, indeed, the spirits are not produced by the act of distillation; that is done by the previous step of fermentation (q.v.); and distillation merely separates the spirits from the mixture in which they already exist. But it may be as well to give some account of the whole process under this head.

All the intoxicating drinks used in ancient times seem to have been the products of fermentation merely. The art, as it has been called, of evoking the fiery demon of drunkenness from his attempered state in wine and beer, is a discovery of modern times. It is first mentioned by an Arabian physician of the 11th c., Abulkasem, though the invention is attributed by some to the northern nations. The name *aqua vitæ*, given to distilled spirits by early physicians and alchemists, shows what an estimate they made of the discovery. Raymond Lully "declares this admirable essence to be an emanation of the divinity, an element newly revealed to man, but hid from antiquity, because the human race were then too young to need this beverage, destined to revive the energies of modern decrepitude." Sadly have these anticipations been belied!

Spirits were first distilled from wine, and hence called spirits of wine. An endless variety of substances are now used in this extensive manufacture. Alcohol (q.v.) is the essential ingredient of all spirits, and it results from the decomposition of sugar, which, by the process of fermentation, is resolved into carbonic acid and alcohol. *Sugar*, then, is the direct source of alcohol, and accordingly all vegetable products containing sugar, such as grapes, the sugar-cane, sweet fruits, beet-root, etc., may be used in the manufacture of spirits. But there is another more abundant vegetable substance—namely, *starch*—which is easily convertible into sugar, and thus becomes indirectly a source of alcohol. In malt, and in germinating seeds generally, there is found a substance called *diastase* (q.v.). If a small quantity of this, or of an infusion of malt, be added to a paste of starch, it will in a short time become thin and sweet, the whole of the starch being transformed into sugar. See BEER. It is thus that grain of all kinds, potatoes, and other substances which contain little or no free sugar, are yet capable of yielding alcoholic spirits.

All substances, then, containing either sugar or starch, or both, will yield spirits. With sugar, the manufacture consists of two processes—fermentation and distillation. When starch is the original source, as is more commonly the case in the distilleries of this country, the first step is to convert it into sugar, or to *saccharify* it. This is the object of what is technically called *mashing*, which consists in mixing the materials in a triturated state with water at the temperature of about 160°. It is mostly from barley, oats, and rye that spirits are manufactured; wheat is less used, owing to its cost. Raw grain is ground to meal; malt is only bruised. A certain proportion of malt is always used, even in distilling from raw grain or potatoes, as the diastase of the malt is necessary to set agoing the saccharine fermentation. After being agitated for two or three hours, the saccharine infusion, called *wort*, is drawn off from the grains, and cooled. To this wort is now added a certain quantity of yeast or barm, which induces the vinous fermentation, and resolves the saccharine matter into alcohol and carbonic acid, accompanied by a rise of temperature. The alcoholic mixture which results is called the *wash*, and is now ready for distillation. This takes place in an apparatus called a still, or alembic (q.v.). In its older and simpler form, the still consists of a copper vessel, into

which the wash is put. This vessel is provided with a close head, terminating in a bent tube, which passes, in a spiral form (the worm), through the refrigeratory, filled with cold water. See STILL. When heat is applied to the still, the spirit begins to rise in vapor at 176°, along with more or less steam; these vapors pass through the worm, become condensed by the cold, and drop or trickle in the form of liquid into a receiver. The product of this first distillation in a simple still is called *low wines*. This is then redistilled at a lower temperature, in order to deprive it of part of the water and of the fetid oils that had passed over with the alcohol. To obtain great purity and strength, repeated distillation is used.

A great improvement in distilling was invented in 1801 by a workman of Montpellier, of the name of Adam. By making the vapors arising from the still pass through a series of winding passages, maintained at a determinate degree of heat, and deposit part of their water and other impurities, he was able to obtain from wine a spirit of any required cleanness and strength *at one operation*. This principle has been adapted, by Pistorius of Berlin (1817), to the distillation of the coarser washes of grain and other materials.

Absolute or anhydrous alcohol (q.v.) cannot be obtained by distillation alone. Rectified spirit, or spirit of wine, for burning in a lamp, still contains, when of ordinary strength, about 25 per cent of water. Alcohol is considerably lighter than water, its specific gravity being 793 (water, 1000). The stronger any spirit is, then, the less will be its specific gravity; and thus the strength of spirits may be ascertained by an instrument which measures their specific gravity, the *aèrometer* (q.v.) or *hydrometer*. The excise of Great Britain has established one degree of strength as the legal standard, and this is called *proof*. The specific gravity of proof-spirit is 918.6, and it contains nearly equal weights of water and alcohol.

If only alcohol and water passed over in distillation, all spirits, from whatever extracted, would be the same; but this is not the case. Brandy, which is distilled from wine, has a peculiar essential oil derived from the grape, and also some acid; rum is impregnated with an essential oil from the sugar-cane, and with other impurities; malt liquor has the essential oil of barley, etc. It is these essential oils that give to the various spirits their distinguishing flavors. Some of the oils and other impurities are disagreeable and positively noxious; and it is the objects of *rectifying* to remove these. The mellowing effect of age upon spirits is owing to the evaporation or spontaneous decomposition of the essential oils. Newly distilled spirits are in general fiery, and specially unwholesome.

Sugar, when fermented, resolves itself into nearly equal weights of carbonic acid and alcohol; a pound of sugar, therefore, should yield upwards of half a pound of proof-spirit. The quantity of spirit afforded by different grains depends upon the proportion of starch they contain: 100 pounds of starch is calculated to yield 35 pounds of alcohol, equal to nearly 8 gallons of proof-spirits. Of the various grains, wheat is the most productive. Taking the average of wheat, barley, rye, oats, and maize, 100 pounds of corn yield 40 pounds of spirit of specific gravity 942 = 3.47 gallons proof. A distiller of malt whisky, says Dr. Ure, calculates on obtaining two gallons of proof-spirits from one bushel of malt in ordinary years. The highest yield is 20 gallons per quarter of 8 bushels.

The principal intoxicating beverages produced by distillation are. 1. Brandy (q.v.), which name is applied properly only to spirits distilled from wine. 2. Rum is manufactured from molasses and other uncrystallizable products of the sugar-cane. 3. Corn or malt spirit, under the various names of British spirits, gin, whisky, etc. The Dutch distillers give a peculiar flavor to their spirits (Hollands) by adding a portion of juniper-berries to the other ingredients. From the French name of the juniper, *genièvre*, come *geneva* and *gin*. 4. Spirits from various vegetable substances. In Germany, a great quantity of spirit is distilled from potatoes, which contain about five per cent of starch. Beet-root and carrots are also used in the same way. The Swedes make a kind of spirit from the sap of the birch, and the maple and other trees are turned to a similar account. We have, besides, cherry-brandy, peach-brandy, cider-spirit, etc. 5. Arrack (q v.) is the East Indian name for all ardent spirits. See SPIRITS.

DISTILLATION, DESTRUCTIVE, is the term applied to the process of heating vegetable and animal substances in retorts or similarly closed vessels, at a temperature sufficient to decompose the original substance, and obtain therefrom products possessing different properties from the material which yielded them. Examples of this process are, the heating of coal in gas-works at a red heat, when it resolves itself into coke, which is left in the retort, and coal-gas, naphtha, tar, etc., which distill over into suitable receivers; the treatment of coal at and below a low red heat, when it yields much paraffine oil; the distillation of wood in close vessels, at a red heat, when charcoal is left in the vessel, and wood-vinegar, wood-spirit, tar, etc., pass over in vapor, and are condensed; and the heating of bones in similar retorts, when animal charcoal is left in the retort, and Dippel's animal oil distils over.

DISTILLED WATER is the condensed product obtained by the distillation of water. All natural waters, even rain-water, contain certain saline matters (common salt, etc.) in a state of solution, from which they can only be completely freed by the process of distillation. The characters of distilled waters are, that it possesses a mawkish, insipid

taste, without odor or color, and when evaporated to dryness in a vessel, it ought to leave no residue. The other properties of distilled water will be noticed under WATER.

DISTILLED WATERS are obtained by distilling water along with the parts of plants containing essential oils. Rose-water and lavender-water are familiar examples.

DISTORTION. The rules of perspective impose certain conditions in the delineation of natural objects, and when the image formed by a lens on the focusing screen of a camera obscura does not fulfill those conditions, it is said to be distorted. The effect of distortion is to render all straight lines, which do not pass through the center of the lens, curvilinear, and also so to alter the relative proportions of objects in the picture as to be opposed to the principles of true perspective. Distortion, in the camera obscura, is generally produced by the eccentrical incidence of the oblique pencils.

DISTREIN. See DISTRESS.

DISTRESS, in English law, is the common-law remedy by which a man may remunerate himself for non-payment of rent or other duties, or may impound another's cattle trespassing upon his land. Distress is defined to be "the taking of a peronal chattel out of the possession of the wrong-doer into the custody of the party injured, to procure a satisfaction for the wrong committed."—Stephen's *Com.* iii. 342. Distress is a remedy of the feudal law. It was an incident quite inseparable from the fealty to the lord; so that, as lord Coke lays down, a lord granting the rent to another, and retaining the fealty, the grantee of the rent could not distrein.—*Co. Litt.* 150 *a.* Distress was incident to every service; hence it might be put in force for failure to do suit in the lord's court, or for not payment of the duties awarded in a court leet. In modern days, distress is practically enforced chiefly for non-payment of rent, for non-payment of certain public rates, and upon cattle straying upon land not belonging to their master. Cattle so straying may be impounded and retained as security till their owner makes satisfaction. Distress for public rates is allowed by the statutes imposing the rates. In this species of distress, and distress for non-payment of rent, the articles are not merely kept as security, but may be sold to pay the amount due. Whatever goods the landlord finds on the premises, even goods belonging to a stranger, may be distreined; but animals *feræ naturæ,* and goods delivered to the tenant by way of trade, may not be taken. A landlord may, by special statute, 11 Geo. II. c. 19, distrein goods fraudulently carried off the premises; and by the same statute he may, with the assistance of the peace-officer of the parish, break open doors to obtain the goods so removed.—See Stephen's *Com.* iii. 341–50.

DISTRIBUTION OF LIFE, ANIMAL AND VEGETABLE. In the light of modern discoveries, the interdependence of every part of nature is clearly revealed, and the life of the world is seen to be one symmetrical organism, the different parts of which are distributed in time and in space by the operation of laws as yet but imperfectly understood. Animals and plants, though sustaining very close relations to each other, form two distinct branches of study, whose phenomena require to be carefully discriminated. Animals are divided into terrestrial and aquatic, the first class being the most important and best understood. Their distribution is considered in two aspects—the climatical and the geographical—which present distinct and sometimes conflicting classes of facts. Of the two, the geographical conditions are the most important. The range of animals is determined in some degree by the altitude or depression of the land-surface on which they dwell. A very important element to be considered, in determining the causes of the distribution of animals, is found in their different powers of dispersal or migration, some having no means of passing over seas, or lofty mountains, or arid deserts, while others, especially the insect tribes, are not thus limited. But migrating animals can not always maintain themselves in a new region, the organisms in previous possession of the soil being too strong for them. The power of adaptation is generally inferior to the power of dispersion. The nature of the vegetation determines the range of some animals. Deserts, marshes, and forests have each their peculiar inhabitants, which do not often stray beyond their limits. Tropical forests especially supply the wants of a great number of peculiar form of life. Mountains of great height and in unbroken ranges form a barrier to the migration of many groups, but their geological age is limited, while oceans, owing to their great antiquity, have separated the faunas of different continents for countless ages. The zoological regions of the earth, according to the best authority, are six in number, each one having marked and distinct peculiarities. The last of these divisions is the Nearctic, which comprises all temperate North America, and is subdivided into the Californian, the Rocky mountain, the Alleghany, and the Canadian regions. The peculiar fauna of the Nearctic region is best represented in the United States, where many peculiar genera of mammalia, birds, reptiles, and insects are found. The distribution of the higher animals during the post-tertiary and tertairy periods is a subject of very deep interest. It is found that, during the post-tertiary period, the reindeer and the antelope inhabited France; elephants and rhinoceroses roamed all over Europe; in North America there were lions, horses, camels, bisons, elephants, and mastodons. This period was characterized by great movements or migrations of the higher animals, and by the extinction of many huge creatures belonging to almost every order of mammalia, and several orders of birds. The tertiary fauna of North America, compared with that of Europe, exhibits proof of a former communication between the two northern conti-

nents. From the knowledge now possessed of the extinct fauna of most of the great continents, scientists can approximately determine the original birthplace of some now widely distributed groups. The distribution of the marine animals also presents many interesting phenomena, but they cannot be noticed here. The geological record on which depends our knowledge of the distribution of animals in respect to time, though it reveals much important truth, is yet very imperfect. The evidence, so far as it goes, tends, it is thought, to confirm the doctrine of evolution.

The distribution of vegetable life is involved in much obscurity. For a long time the investigation of the subject was pursued under great disadvantages, and with very unsatisfactory results. The writings of Darwin, Hooker, Gray, and Bentham, however, have thrown much light on the subject. Bentham recognizes three ancient floras—the northern, the tropical, and the southern. The northern is divided into that of the old and new world by the severance of North America from Northern Asia, and by the barriers of the Rocky mountains. The divergences in the flora of these two regions originated in distance, but have been greatly increased by isolation. Lesquereux believes that the origin of the present American flora is American. There is a strong analogy, however, between it and the miocene flora of Central Europe, and the American element in the latter is supposed to be derivative, confirming the observation of Gray that plants tend to migrate from east to west, rather than from west to east. The boundaries of the northern flora, under the influence of climatic variations, have also undergone longitudinal changes. The northern flora, by the combined influence of physical and genetic causes, has undergone a specialization into three distinct groups—the Arctic-Alpine, the temperate, and the Mediterraneo-Caucasian. The southern flora is still more complex in its relations, and is described in five types—the Antarctic-alpine, the Australian, the Andine, the Mexico-Californian, and the South African; the latter, though limited in extent, being the richest of all. The tropical flora has hardly as yet been investigated. It presents three subdivisions—the Indo-Malayan, the American, and African; the latter, especially, being very imperfectly known. This whole branch of science is, in many respects, an unexplored field and a very inviting one to naturalists. See GEOGRAPHICAL DISTRIBUTION OF ANIMALS, AND GEOGRAPHICAL DISTRIBUTION OF PLANTS, *ante*.

DISTRIBUTIONS, STATUTE OF, the statute 22 and 23 Car. II. c. 10, explained by 29 Car. II. c. 3. This statute regulates the division of the estate, according to the law of England, of a person dying intestate. A widow is by this act entitled to one third of the estate in case there are children, the remainder being divided between the children in equal portions. If there be no children, the widow has half, and the other half is divided among the nearest of kin, or their representatives. If no widow, the children take all. If neither widow nor children, the estate is divided amongst the next of kin. In this case, the father (or, if he be dead, the mother) excludes brothers and sisters of the deceased; but by 1 Jac. II. c. 17, the mother of an intestate must take equally with the brothers and sisters of the deceased.

DISTRIBUTION OF SPECIES. See SPECIES.

DISTRICT ATTORNEY OF THE UNITED STATES, a member of the bar appointed to try civil and criminal suits for the government in the circuit and district courts of the United States, and required by law to report his doings to the attorney-general in Washington. He has a merely nominal salary, but receives fees, often large, prescribed by act of congress. The office is one of responsibility and honor.

DISTRICT, CONGRESSIONAL, that portion of the territory of a state the voters in which are by law entitled to choose once in two years a representative to the congress of the United States. The number of such districts varies from time to time, being fixed by congress immediately after each decennial census. (See APPORTIONMENT BILLS.) The boundaries of the district in each state are determined by the legislature thereof. The ratio of representation (number of inhabitants required for a district) under the census of 1870 is 131,425; the number of districts is 293. The ratio is raised after each census, on account of increase of population, as otherwise congress would be inconveniently large. The time may come when a member of congress will represent a million of people. The constitution declares that each state shall have at least one representative, even if its whole population should at any time come short of the prescribed ratio. Under this rule the state of Delaware with a population of only 125,015 has one representative in the lower house of congress, while in the senate its representation is equal to that of any other state. It is probable that the population of some other small states will ere long fall below the decennial ratio of representation.

DISTRICT OF COLUMBIA (COLUMBIA, *ante*), a small territory between Maryland and Virginia selected in 1800 as the site for the national capital of the United States. The selection of a place for the seat of government provoked the first discussion of a sectional nature after the adoption of the federal constitution. The government was organized at New York, Mar. 4, 1789, and congress met in that city until 1791. In 1790, after a long discussion, a bill was passed providing that the seat of government should be changed to Philadelphia, where it should remain from Dec., 1790, to Dec., 1800, at which time it should be upon "a district of territory not exceeding 10 sq. m., on the

river Potomac, between the mouth of the eastern branch and Conogocheague." The land was on both sides of the Potomac, and was ceded by the owning states with the condition that congress, or the United States, should have exclusive control forever. Maryland ceded 64 sq.m., or the whole of Washington co.; and Virginia ceded 36 sq.m., which was Alexandria co.; but in 1846, the Virginia portion was returned to that state, as no part of the government establishment had been erected s. of the river. It is said that the site of Washington, or near there, was a favorite meeting-place for Indians. Among the earliest white settlers was an Englishman named Pope, who bought land and named the stream flowing through it the Tiber, and to the eminence on which the United States capitol now stands, he gave the name of Capitoline hill, calling his whole plantation Rome, and signing himself "Pope of Rome." About 60 years before the revolution, one of the ancestors of Daniel Boone owned the land now occupied by the city of Georgetown, on which he laid out a town of the same name. The first movement towards selecting a permanent seat of government was in 1783, when, through acts of mob violence, congress was forced to adjourn from Philadelphia to Princeton, New Jersey. At that time Elbridge Gerry of Massachusetts offered a resolution (adopted, but afterwards repealed) providing for the selection of a site on the Delaware, and one near the falls of the Potomac, his idea being to have a northern and southern capital. The authority to select a site was given, finally, in the federal constitution. The government title to the territory was perfected, and buildings suitable for the accommodation of congress and the executive departments were ready at the prescribed time, and on the first Monday of Dec., 1800, the capital was fixed in the federal city called Washington. For many years afterwards, Washington was but the skeleton of a town, and from its ambitious proportions was nicknamed "the city of magnificent distances," while even the poets flouted its pretension with the line, "And what was Goose creek once is Tiber now." In 1814, the British took possession of the territory, and burned the capitol and other public buildings. Soon after that war, the District of Columbia began to improve in population and industries. When the rebellion began, strong fortifications were erected for the defense of Washington, which was several times menaced or in danger, but never actually attacked.

The district of Columbia was governed directly by congress until 1871, when the people of the district were given the privileges of self-government as a regular territory; but thus far they have sent no delegate to congress. As in other territories, the voters have no voice in presidential elections; and it is a singular fact that until the act of 1871 many of the people residing in this district in sight of the capitol were not political citizens of any state nor of the nation. The territorial act creates a governor and secretary, appointed by the president and United States senate; a council of 11, and a house of delegates of 22 members, with annual sessions limited to 60 days. Pay of governor, $3,000 a year: legislators, $4 per day. Suffrage is the same as in nearly all the states.

At the commencement of 1879, there were in the district 6 daily and 14 weekly newspapers, and 5 monthly and 1 quarterly publication—26 in all. Children between 6 and 17 are within school age, and in 1878, there were 38,850 in the district; 24,000 enrolled; average attendance, 16,318; school days, 195; teachers, 40; income for education, $385,000; expenses, $270,000; school property valued at $1,169,614. The colleges are: Columbia university (Bapt.); Gonzaga college (R. C.); National deaf-mute college (non-sect.); and Howard university (non-sect., though under Cong. and Pres. patronage); all at Washington; and Georgetown (R. C.) college. In all these there were 41 instructors and 268 pupils. Both sexes are admitted to Howard university, and colored students are admitted to the theological department. The Baptists have also a school (Wayland seminary) in Washington; there are medical departments in nearly all the colleges, and also a National college of pharmacy. All except the Roman Catholic institutions have law departments, in which there were 12 instructors and 342 students; in medicine, 42 instructors and 183 students. (For latest statistics, see Appendix).

DISTRICT COURTS OF THE UNITED STATES, tribunals subordinate to the circuit courts. Each of the nine judicial circuits (corresponding to the number of justices of the supreme court) is divided into a larger or smaller number of districts. In some instances a district embraces the whole territory of a state; in others, states are divided into two or more districts. In one instance a single judge serves three, in others, two districts. With these exceptions, there is one judge for each district. When a circuit court is held within the limits of a judicial district, the district judge sits with the judge of the supreme court appointed for that circuit.

DISTRICT, SENATORIAL. A territory, the electors of which are entitled to choose a representative in the upper branch of a state legislature. The U. S. senators are chosen by the state legislatures, two for each state, without reference to population; hence the term district is in no way applicable to them.

DISTRICTS, MILITARY, are certain regions into which the United Kingdom is divided for military purposes, to facilitate command and organization. Before Mr. Cardwell's act of 1872, England was divided into four districts, and Ireland into five, while Scotland formed one. Now there are nine general districts in England—namely, the northern, with Manchester as its headquarters; the eastern, with Colchester; the southern, Portsmouth; the south-eastern, Dover; the home district, London; the Chatham; the

Woolwich; the Aldershot. In Ireland there are four—Belfast, Dublin, Cork, and the Curragh. Scotland is still one district, with Edinburgh as head-quarters. Jersey is a military district; and Guernsey and Alderney form another.

DISVELLOPED, or DEVELOPED, is applied to the colors of a regiment or army, which are said, heraldically, to be disvelloped when flying.

DITCH, in agriculture, is a trench usually made along the sides of fields, so that all the drains may be led into it. A hedge is often planted along the side, and the two form a better fence for cattle. In cold, undrained lands, the earth thrown out of the trench forms a mound of dry earth, which is particularly serviceable for the growth of thorn-hedges. Accordingly, this is the common mode adopted in planting hedges in such districts, where the subsoil is often close, tenacious, and not well suited for their growth. Various forms of ditches are made; sometimes a double D. is adopted, and the hedge planted between. In arable lands, however, since the general use of small and large pipes, ditches have been converted into underground drains, which has effected a great saving of land, as well as giving to the fields a tidy appearance.

DITCH is one of the most important of the defense-works of a fortified place. It is a broad and deep trench, that may either be kept dry or filled with water; in practice, it is generally dry.

In permanent works, such as the regular fortifications of a town, the *rampart* and the *ditch* are the most important; the former being inside the latter, and formed mainly of the earth excavated from it. The D. is often 120 ft. wide, 12 ft. deep below the natural level of the ground, and 24 ft. beneath the parapet of the rampart. See COVERT WAY.

DITHYRAM'BUS, originally a surname of Bacchus, of uncertain derivation and meaning, was subsequently applied to a species of lyric poetry cultivated more particularly at Athens, and characterized by loftiness and vehemence of style, which, however, at a later period, degenerated into bombast and extravagance. The D. was originally a passionate hymn, sung by one or more revelers to the music of a flute; but Arion (q.v.) invented for it a regular choral or antistrophic form. It is this form which is generally spoken of as the dithyramb. It subsequently received various alterations, but no specimens of it have survived.

DITMARSH, NORTH and SOUTH (*Norder* and *Süder Dithmarschen*), the name given to the western district of the German duchy of Holstein, lying between the Eider and the Elbe. The entire area is 500 sq. miles. Pop. 75,000. In old German times, D. formed a part of Saxony beyond the Elbe, and is worthy of special notice, because the inhabitants have preserved to the present day the peculiarities of antiquity. It has its own collection of laws, known as the *Ditmarsh Land-book*, which originated in 1321 from 48 judges; was altered in 1447, first printed in 1497, amended in 1567, and finally enjoined anew in 1711. Whatever authentic notices, traditional and otherwise, we possess of D., we owe to Joh. Adolfi (b. 1559, d. 1629), whose *Chronik des Landes D.* (Ditmarsh Chronicle), written in the Lower Saxon dialect, was published in the original text, with 23 dissertations by Dahlmann (Kiel, 1827).

DITTANY, *Dictamnus*, a genus of plants of the natural order *rutaceæ*, having a short 5-partite calyx, 5 somewhat unequal petals, 10 stamens, and 5 1 to 3-seeded follicular capsules cohering at the base. The COMMON D., also called BASTARD D., or FRAXINELLA (*D. albus*), a native of sunny mountains and rocks and dry mountain-forests of the s. of Europe, especially in calcareous soils, is very generally cultivated as a garden-flower. It is a perennial, with stem 1½ to 3 ft. high, perfectly unbranched, bearing a few pinnated leaves, which have 3 to 5 pair of leaflets and an odd one, and terminating in a beautiful erect raceme of 10 to 20 flowers. The flowers are of a fine rose color, with darker veins, more rarely white. The plant diffuses a powerful fragrance from its numerous oil-glands when in flower, and during dry, hot weather exhales such a quantity of volatile oil that its sudden combustion makes a slight flash when a candle is brought near it on a warm summer evening. The root is thick, white, and very bitter, and was formerly in high repute in medicine as a tonic stimulant, but is now neglected.—D. of Crete, used as a febrifuge, is a very different plant (*Origanum dictamnus*), a kind of marjoram (q.v.).

DIT'TAY, a technical term in the criminal law of Scotland, now little used, signifying the ground of indictment or substance of the charge. By *taking up dittay* was understood the collecting of information in order to trial, which is now effected by what is called a precognition.

DITTEE'AH, or DUTTEEAH, a t. in Hindustan, 125 m. s.e. of Agra; pop. about 50,000. It is a walled town, and the capital of a rajahship.

DITTON, HUMPHREY, 1675–1715; an eminent English mathematician, for some years a dissenting clergyman. The influence of sir Isaac Newton secured for him a professorship in the new mathematical school at Christ's hospital, where he remained through life. He and Whiston published a new method for determining longitude at sea, but it was rejected by the board of admiralty. Ditton was the author of several mathematical works.

DĬU', a seaport, situated at the eastern extremity of an island of the same name off the s. coast of Guzerat, in Hindustan; is well fortified, having a tolerably safe harbor, with a general depth of three or four fathoms. The anchorage, however, is said to be gradually becoming shallower. Pop. of town about 11,000. The place has been in possession of the Portuguese ever since 1515; but, from its detached and isolated position, its trade is of little consequence.

DIURET'ICS, medicines having the property of increasing the secretion or excretion of urine, and on this account much employed in dropsies, as well as in a variety of other diseases. The principal diuretics are the salts of potash, especially the nitrate, acetate, and bitartrate (cream of tartar); squill in powder, vinegar, or sirup; digitalis or foxglove, in powder or infusion; the decoction or infusion of broom-tops (*scoparium*): the decoction of the American winter-green or pyrola; the alcohols and ethers, with most of the volatile oils, especially that of juniper, as in gin; the berries of the common elder; the tincture of cantharides or Spanish flies; turpentine, etc. The last named (from the alcohols onwards in the above enumeration) are more or less irritating in their effects on the urinary organs, and should not be used without due consideration as to the requirements of the particular case. Cream of tartar and the broom-decoction form one of the safest and best diuretic mixtures which can be employed for domestic purposes; or cream of tartar may be given alone, either dissolved in hot water, and allowed to cool, or in substance along with sirup.

DIVAN' is a Persian word, having various significations. It is used in the sense of a muster-roll, a register of payments or account; it is also applied to a collection of poems or songs by one and the same author. Goethe uses it in this sense in his *Westöstliche Divan.* Divan means next an administrative board; the highest council of state at Constantinople is called *Diváni humájún,* most illustrious divan. Finally, divan is the name for the state or reception room in palaces and the private houses of the richest citizens. Along the walls of the room are ranged low sofas, covered with rich carpets, and provided with many cushions. Hence the name divan has been transferred in the w. of Europe to a kind of sofa.

DIVEL ON THE NECK, an instrument of torture used against the Lollards. It is thus described by FOX, in his *Acts and Monuments:* "Certain strait irons called the divel on his neck being after an horrible sort devised, straitening and winching the neck of a man with his legs together, in such sort as the more he stirreth in it, the straiter it presseth him, so that within three or four hours, it breaketh and crusheth a man's back and body in pieces."—Cowel's *Interpreter.*

DIVER, or LOON, *Colymbus,* a genus of birds of the family *colymbidæ* (q.v.), having a strong, straight, rather compressed pointed bill, about as long as the head; a short and rounded tail; short wings, thin compressed legs placed very far back, and the toes completely webbed. They fly well, but are particularly expert in diving. They prey upon fish, which they pursue under water, making as much use of their wings as of their legs and webbed feet in their subaqueous progression. They are scarcely capable, however, of walking on land, and the name *loon* is supposed to refer to this incapacity, and to be from the same root with *lame.* The GREAT NORTHERN D., or LOON, also called the IMMER or EMBER GOOSE (*C. glacialis*), is a bird about 2½ ft. long, exhibiting no little beauty of plumage; the upper parts black, spotted with white; the head black, with tints of green and blue; the belly white. It is a winter visitant of the British coasts, even to the furthest s., and is occasionally seen in inland districts; is found in like manner in most parts of Europe, the n. of Asia, and North America, as far s. as Texas, but it breeds chiefly in the more northern regions, as Labrador, Iceland, and Spitzbergen. It is not exclusively marine, being often seen on large rivers, and making its nest on the shores of fresh-water lakes. Its cry is very peculiar and wild, has been likened to the howl of a wolf, and is in some countries superstitiously regarded as ominous of evil. It is easily tamed, and becomes very familiar. The BLACK-THROATED D. (*C. Arcticus*) is another northern bird, of similarly wide geographic distribution, but much smaller size, being only about 26 in. in length. It is found at intervals distributed round the coasts of Britain, and it occasionally breeds in the fresh-water lochs of the n. of Scotland. The RED-THROATED D. (*C. septentrionalis*) is also found in all the northern parts of the world, is more common in Britain than either of the other species, and is the bird generally called loon on the British coasts. In size it scarcely equals the black-throated diver. Its back is brownish-black, the belly white, the throat red. The flesh of all the divers is dark, tough, and unpalatable.—The name D. is sometimes extended to all the *colymbidæ* (q.v.), sometimes to all the *brachypterœ* (q.v.).

DIVERGENT. See CONVERGENT.

DIVERTIMENTO, or DIVERTISSEMENT, a species of musical composition consisting of different movements, arranged in an easy style for one or more instruments, but not so elaborately wrought out as the sonata, or other more regular compositions. The D. has generally no fixed character, being merely a musical picture without any attempt at artistic effect, or other aim than to please the ear, and may be said to take its place between the *etude* and the *capriccioso.* The D. was greatly in vogue during the last half of the 18th c.; until then, the word had never been used to denote a musical composi-

tion. In France, D. is the name given to certain dances and songs introduced between the acts of an opera, or play, for the amusement of the public during the pause, and as such it was used there much earlier than in Italy or Germany.

DIVIDEND, the sum apportioned to creditors from the realized assets of a bankrupt estate, and which is at the rate of so much per pound of the claims. The half-yearly interest on the public funds, and periodical profits on shares in joint-stock undertakings, are also called the dividends, the latter being usually declared half-yearly, by order of the directors. Occasionally the dividends do not exhaust the profits, and the surplus is allowed to accumulate, until it is paid to the shareholders as an extra D. called a bonus.

DIVIDING ENGINE. See GRADUATION.

DIVIDIVI, or LIBIDIBI, the curved pods of *cæsalpinia coriaria* (see CÆSALPINIA), a tree which grows on the coasts of Curaçoa, Carthagena, and other parts of tropical America. They have been long used there for tanning, but have recently acquired importance as an article of commerce. A considerable quantity is now annually brought to Britain. D. is one of the most astringent substances known.

DIVINATION (Lat. *divinatio*) is the act of discovering the hidden, but more particularly the future, in a supernatural way. Men have at all times set their imaginations above the causes of nature, and by a curious subjective process, have endeavored to draw out of themselves what could in reality be only derived from a study of the laws of nature. Thus, there have been instituted systems of superstition among almost all nations of the world at one period of their history, which the march of scientific discovery and the beneficent influences of a rational religion have failed to wholly eradicate, so that, even among comparatively enlightened peoples, there lurks a deep substratum of this old-world feeling. A more special use of the term is to denote fortune-telling or sorcery (middle-age Latin *sortiarius*, one who reads the future by means of lots or *sortes*). It was a maxim with the nations of antiquity, that if there are gods, they care for men; and if they care for men, they will send them signs of their will. This, with some variations, has been a universal sentiment in all ages and countries. But it was the first step in this journey which presented the whole difficulty. How was man to know the will of the gods? The variety of answers which this question has drawn forth constitutes the history of divination. Thus, among the Greeks, the word for D. was *mantikē*, which signified more than the Latin *divinatio;* inasmuch as it was applied to any means by which the Deity discloses himself to man, while the Latin word denoted more the power which man is supposed to possess of discovering the future. With the Greeks, the seer was passive; with the Romans, he was active. See SEER and ORACLE. Astrology was a favorite method of D. among the ancient Chaldeans, as well as in the middle ages. *Auguries* and *auspices*—both words derived from *avis*, a bird—were systems brought to perfection by the Romans as means of knowing the will of the gods. See AUGURIES and AUSPICES. The sacrifice of beasts, besides, the casting of the horoscope, and the observing of the constellations, were all favorite modes of guessing at the future practiced by the Romans. But the belief was not confined to the old world. The Araucanians, a warlike nation of South America, seem to have placed as implicit faith in the D. of birds as did the Romans, and they practiced this art in a way not very dissimilar. Even among ourselves, the merry-thought bone of fowls is known to possess a curious virtue, and boys need not be told the omens connected with the magpie.

An extensive set of omens have been taken from observing what first happens to one, or what animal or person one meets first in the morning, or at the commencement of an undertaking—the *first-foot*, as it is called. To stumble, has been universally held to presage misfortune. Some semblance of a reason might be found for this belief, inasmuch as stumbling may be supposed to indicate that that self-possession and conscious courage, which are in themselves half a victory over circumstances, are lacking—the want of them, therefore, being half a defeat; but in most cases the interpretation seems altogether arbitrary. The dread of a hare crossing the path seems to be widely prevalent; while to see a wolf is a good omen. This feeling is probably a remnant of warlike times, when the timid hare suggested thoughts of cowardice and flight; while the bold wolf, sacred to Odin, was emblematic of victory. The character of the hare for being unlucky is also connected with the deep-rooted belief, that witches are in the habit of transforming themselves into hares. That to meet an old woman is unlucky, is another very general belief; arising, without doubt, from the same causes that lead to their being considered witches. In some places, women in general are unlucky as first-foot, with the singular exception of women of bad reputation. This belief prevailed as far back as the age of Chrysostom. Priests, too, are ominous of evil. If hunters of old met a priest or friar, they coupled up their hounds, and went home in despair of any further sport that day. This superstition seems to have died out, except in the case of sailors, who still consider the clergy a "kittle cargo," as a Scotch skipper expressed it, and anticipate a storm or mischance when they have a black-coat on board. This seems as old as the days of the prophet Jonah.

The observation of *lucky* and *unlucky* days was once an important matter, and was often the turning-point of great events. It is now confined to the one subject of mar-

riage. In fixing the wedding-day, May among months, and Friday among days, are shunned by many people both in the higher and lower orders; for in this matter, which is the exclusive province of women, and in which sentiment and fancy are in every way so much more active than reason, the educated and uneducated are reduced to a level. Perhaps half the superstitious beliefs that yet survive among civilized and Christian communities, group themselves round the subject of love and marriage—of such intense interest to all, yet so mysterious in its origin, and problematical in its issue. The liking or passion for one individual rather than any other, is so unaccountable, that the god of love has been fabled blind; it is of the nature of fascination, magic, spell. And then, whether happiness or the reverse shall be the result, seems beyond the reach of ordinary calculation. All is apparently given over to mystery, chance, fortune, and any circumstances may, for what we know, influence or indicate what fortune's wheel shall bring round. Hence the innumerable ways of prognosticating which of two or more persons shall be first married, who or what manner of person shall be the future husband or wife, the number of children, etc. It is generally at particular seasons, as at the eve of St. Agnes and Hallowe'en, that the veil of the future may thus be lifted.

Sneezing, likewise, has long been looked upon as supernatural, for this reason, that it is sudden, unaccountable, uncontrollable, and therefore ominous. The person is considered as possessed for the time, and a form of exorcism is used. A nurse would not think she had done her duty if, when her charge sneezes, she did not say: "Bless the child," just as the Greeks, more than two thousand years ago, said: "Zeus protect thee."

One general remark, however, it is important to make in regard to omens. An *omen* is not conceived to be a mere sign of what is destined to be; it is conceived as causing in some mysterious way the event it forebodes; and the consequence, it is thought, may be prevented by some counteracting charm. Thus the spilling of salt not only forebodes strife, but strife is conceived as the consequence of the spilling of the salt, and may be hindered by taking up the spilled salt and throwing it over the left shoulder.

An important exercise of the diviner's art is to determine the innocence or guilt of parties. This will be treated under ORDEAL. But it would be impossible to enumerate the endless modes of D. for which learned names have been found. Some of the principal are *axinomancy* (q.v.), *belomancy* (q.v.), *bibliomancy* (q.v.), *botanomancy*, or D. by means of plants and flowers (it was practiced by the ancients, who were wont to bruise poppy-flowers betwixt their hands, under the conviction that they could thereby discover their loves. Hence Theocritus calls the poppy *teliphilos*, quasi *deliphilos*; i.e., a *tell-love*. Goethe has made a beautiful use of another form of this superstition, which existed among the Teutonic races no less than among the old Greeks. The child-like Marguerite, in *Faust*, seeks to discover whether or not Faust loves her by plucking the leaves from a star-flower, murmuring alternately, "He loves me," "He loves me not," and finds to her joy that the *last* leaf comes away while she is saying "He loves me"); *capnomancy* (q.v.), *cheiromancy* (q.v.), *cosinomancy* (q.v.), *crystallomancy* (q.v.), *cup, divination by* (q.v.); *geomancy* (this was anciently practiced by casting pebbles on the ground, from which conjectures were formed; but the Arabian geomancy was more recondite, being founded on the effects of motion under the crust of the earth, the chinks thus produced, and the noises or thundering heard); *hydromancy*, D. by water or by a mirror, in which the diviner shows the image of an absent person, what he is doing, etc. (this mode of D. plays an important part in the Arabian romances); *lithomancy*, a species of D. performed by stones, but in what manner it is difficult to ascertain; *oneiromancy* (see DREAMS); *pyromancy*, or D. by flame (it was common among the Greeks and Romans: if the flame of the sacrifice was vigorous and quickly consumed the victim, if it was clear of all smoke, and did not crackle, but burn silently in a pyramidal form, the omen was favorable; otherwise, it was not); *rabdomancy* (see DIVINING-ROD); and *teraphim* (q.v.).

DIVINE RIGHT. A term applied to describe the source of the power claimed for the monarch, by the royalist party, in the great controversies between the monarchical and the parliamentary or commonwealth parties in England in the 17th century. The monarch was held to be the immediate representative of the Deity, to whom alone he was responsible for all his actions—a principle which, of course, relieved him from all human responsibility. The idea was little known in this country until the quiet transfer of the crown from the Tudor to the Stewart dynasty showed that the hereditary principle was firmly established. It was found by some ecclesiastics in the doctrine of the civil law, which, in imitation of the practice of oriental nations, flattered the Roman emperors by attributing to them a power founded on divine institutions. Throughout a long and miserable contention, D. R. was on the one side maintained to be the source of political power, while on the other it was maintained that that power emanated from the will of the people, expressed in what was called "the social contract." The chief writers on the side of D. R. were Salmasius and sir Robert Filmer; on the other, Milton, Algernon Sydney, and Harrington. The controversy revived in the discussions which caused the French revolution, long after the settlement of the crown on William and Mary and the Hanover dynasty had settled it in Britain.

DIVINE SERVICE, a tenure by which the tenant was bound to do some special divine service, as to sing so many masses, to distribute a certain sum in alms, or the like. It differed from frankalmoigne (q.v.) in this, that the lord could distrain for the former, not for the latter, which, being an indefinite service, could be enforced only by a complaint to the ordinary or visitor.

DIVING. The "treasures of the deep" have at all times been the subject of much visionary exaggeration, and the accounts of the exploits of divers equally extravagant. We could name a popular school-book, still in extensive use, where children are seriously informed that the pearl-divers of the east acquire by practice the power of remaining under water from 15 to 20 minutes. Such statements are common enough in narratives of ancient date, in some of which the time is extended to two hours. It need scarcely be said that these accounts are absurd, no such endurance being possible. The more skillful divers may remain under water for two, or even three minutes; some modern accounts say four, and even six, but this is very doubtful. In a swimming and diving contest between some North American Indians and Englishmen in a London swimming-bath, one of the Indians, a renowned swimmer and diver, remained under water just one minute and a half, but a London artisan beat him by a few seconds.

In the *Encyclopædia Britannica*, prof. Faraday describes an interesting fact to which his attention was directed by a gentleman connected with the Asiatic society, who, according to prof. Faraday, was the first to make the observation. It was observed that by breathing hard for a short time, as a person does after violent exercise, the breath could then be held much longer than otherwise. Prof. Faraday found that he could only hold breath for three quarters of a minute, if he attempted it without preparation, but that after eight or ten of such forced inspirations, he could hold breath for two minutes. This he explained on the supposition that, ordinarily, a considerable quantity of carbonic acid remains in the involved passage of the lungs, but that it becomes completely expelled by the forced breathing, and its place supplied by atmospheric air. As regards the novelty of the observation, prof. Faraday was mistaken, as the writer of this can testify, for when a boy, he and his companion bathers in the Serpentine, in Hyde Park, commonly practiced it. The Red Indian and the artisan above referred to also did the same; it is, in fact, a sort of preparation that a practiced diver would make almost instinctively. After a few deep inspirations of this kind, a sense of giddiness is felt, and it is not prudent to carry the experiment far beyond this stage, as a fit of insensibility not unlike apoplexy is apt to result.

This giddiness, which is always produced, and the possible insensibility, indicate a different explanation from that of Faraday. The mere removal of residual carbonic acid from the lungs is not sufficient to explain these; we should rather suggest that all the phenomena result from an excessive oxygenation of the blood, and a consequently accelerated circulation similar to that produced by breathing nitrous oxide. It will be easily understood, that if the blood be forced to take an excess of oxygen, a longer time should elapse before a fresh supply would become necessary—that is, before suffocation would take place; and the giddiness, flushing of the face, and the insensibility, are results to be expected from such an excess.

Most divers suffer severely from the continual efforts in holding the breath; blood-shot eyes and spitting of blood are common among them. This rude mode of diving is now but little used except for pearl and sponge fishing; and even for these purposes, only an uncivilized people, with very little capital and knowledge, would continue to use it, as the modern applications of science afford such immense advantages for all kinds of subaqueous operations, as will be seen by the next article.

DIVING-BELL. From what has been stated in the preceding article DIVING, it will be at once understood that for all such purposes as subaqueous works upon the foundations of piers, bridges, etc., or the exploration and raising of sunken vessels, the efforts of the unaided diver would be almost valueless, and accordingly various contrivances for supplying air to the diver have been made. The *cacabus aquaticus*, or aquatic kettle, described by Taisnier as having been used by two Greeks in Spain, at Toledo, in 1538, in the presence of the emperor Charles V. and a multitude of spectators, is one of the earliest reliable accounts of a diving-bell. From his description, this must have been similar in principle and construction to the modern diving-bell, but of clumsy dimensions, and wanting in efficient means of renewing the supply of air. Dr. Halley's diving-bell, about 1720, was a wooden chamber of about 60 ft. internal capacity, open at the bottom, where it was loaded with lead to keep it perpendicular in its descent. Strong pieces of glass were set in the upper part to admit light. Casks filled with air, and loaded with lead, were let down with the bung-hole downwards; and from these a supply of air was drawn by means of a hose. The form of diving-bell now in use was first constructed by Smeaton for the works at Ramsgate harbor, 1788. It was of cast-iron, and weighed 50 cwt.; its height, 4½ ft; length, the same; and width, 3 feet. It sunk by its own weight, and was lighted by stout pieces of bull's-eye glass firmly cemented by brass rings near the top. The principle of the diving-bell will be easily understood by floating a piece of lighted candle or a wax-match on a cork, and then covering it with an inverted tumbler, and pressing downwards; the candle will descend below the level of the surrounding water, and continue burning for a short time, although the tum-

bler be entirely immersed. The reason is obvious enough: the air in the tumbler having no vent, remains in it, and prevents the water from occupying its place, so that the cork and candle, though apparently under water, are still floating, and surrounded by the air in the tumbler; the candle continues burning until the oxygen of the air is exhausted, and then it goes out, as would the life of a man under similar circumstances. If vessels full of air, like the barrels of Dr. Halley, were submerged, and their contents poured into the tumbler, the light might be maintained; but this could be better done if a tube passed through the tumbler, and air were pumped from above through the tube into the tumbler.

The modern diving-bell, which is made of cast-iron like Smeaton's, is supplied with air in this manner. It must be remembered that air is compressible, and diminishes in bulk in proportion to the pressure, so that at a depth of about 33 ft. in water, it would occupy half the space it filled at the surface; if the inverted tumbler were carried to this depth, it would be half filled with water. A considerable quantity of air has, therefore, to be pumped into the diving-bell, merely to keep it full as it descends; the air thus compressed exerts a corresponding pressure, and would rush up with great force if the tube were open and free. This is prevented by a valve opening downwards only. When the diving-bell has reached its full depth, the pumping is continued to supply air for respiration; and the redundant air overflows, or rather *under*flows, by the open mouth, and ascends to the surface in great bubbles. The diving-bell is provided with a platform or seat for the workmen, and suspended from a suitable crane or beams projecting from a barge or pier; men above are stationed to work the pumps, and attend to the signals of the bellman. These signals are simply made by striking the sides of the iron diving-bell with a hammer, and as sound is so freely communicated through water, they are easily heard above. One blow signifies "more air;" two blows, "stand fast;" three, "heave up;" four, "lower down;" five, "to eastward;" six, "to westward," etc. These, of course, may be modified as agreed upon. Messages are also sent up, written on a label attached to a cord. The sensations produced in descending are rather curious. Immediately on the mouth of the diving-bell striking the water, a feeling like a slight blow on the internal ear is produced; a dull ringing in the ears and a sense of deafness follows.

The workmen accustomed to subaqueous existence do not suffer these inconveniences; novices feel pains in the head and ears, but these pass away after a short initiation. It is stated that one man who had suffered from difficulty of breathing was completely cured by "belling," and that deafness is not produced by it, but, on the contrary, is in some cases relieved.

DIVING-DRESS. In Schott's *Technica Curiosa*, published in 1664, is described a *lorica aquatica*, or aquatic armor, which consisted of a leathern dress, to protect the diver from the water, and a helmet. In 1721, Halley describes a contrivance of his own of nearly the same kind; its object was to enable the diver to go out from the bell and walk about; he was to be provided with a waterproof-dress, and a small diving-bell, with glass front, as a helmet over his head, which was to be supplied with air by means of a tube from the diving-bell.

The modern diving-dress is made of india-rubber cloth; a strong metal helmet, with round pieces of plate-glass in front, rests upon a pad on the shoulders; the air is supplied to this helmet from above, in the same manner as for the diving-bell, but instead of the waste air passing out below, a second tube carries it up. Leaden weights are attached to the side of the diver, and thus he may descend a ladder and walk about below. He carries with him one end of a cord communicating with the assistants above, and by pulling this, as agreed upon, makes a series of signals.

DIVINING-ROD—often called the *virgula divina*, the *baculus divinatorius*, the caduceus or wand of Mercury, the rod of Aaron, etc.—is a forked branch, usually of hazel, and sometimes of iron, and even of brass and copper, by which it has been pretended that minerals and water have been discovered beneath the surface of the earth. The rod, when suspended by the two prongs, sometimes between the balls of the thumbs, will distinctly indicate, by a decided inclination, it is alleged, the spot over which the concealed mine or spring is situated. Other powers are ascribed to the divining-rod, but this is the chief. Many men, even of some pretensions to scientific knowledge, have been believers in the occult power ascribed to this magic wand. Agricola, Sperlingius, and Kirchmayer, all believed in its supernatural influence. So did Richelet, the author of the dictionary. The learned Morhoff remained in suspense, while Thouvenot and Pryce, in the latter part of the 18th c., gave ample records of its supposed power. Bayle, in his dictionary, under the word *abaris*, gives some ingenious arguments both for and against the divining-rod. In a work published by Dr. Herbert Mayo in 1847 and 1851, entitled *On the Truth Contained in Popular Superstitions*, he gave some curious illustrations of the art, supposed to be possessed by one in forty of the Cornish miners. At Weilbach, in Nassau, he likewise met with one Edward Seebold, who, he says, possessed the power, but afterwards lost it. Arthur Phippen, in 1853, published a pamphlet containing an account of two professional diviners or dowsers. One of them, named Adams, gave remarkable indications of being able to detect water under-ground. He

not only was able to discover the particular spot where water might be found—he could even perceive a whole line of water running under-ground.

Scientific men, who have bestowed any care on the examination of nature, regard this alleged power of the divining-rod as an unconscious delusion, ascribing the whole phenomenon to the effect of a strong impression on the mind acting through the agency of the nerves and muscles. See ANIMAL MAGNETISM.

DIVRIGI (anc. *Tephrene*), a t. of the province of Sivas, Asia Minor, on the Kurner-Su, a branch of the Euphrates, 28 m. n.w from Arabkir. Pop. supposed to be about 10,000.

DIVISIBIL'ITY is that property of quantity, matter, or extension, through which it is either actually or potentially separable into parts. Whether matter is or is not indefinitely divisible, is a question which has occupied the minds of philosophers since very early times. See ATOM. There is no doubt that, abstractly speaking, it is indefinitely divisible. We cannot conceive any body or space so small but that we can subdivide it in imagination, and thus figure to ourselves bodies and spaces still smaller; and practically, we know that the subdivision of matter is carried in nature far beyond appreciation either by our senses or by calculation. The diffusion of odors through the air for long periods from odoriferous bodies without their suffering any sensible change of weight, and the tinging of great quantities of fluid by very minute portions of coloring matter, are cases commonly appealed to in proof of the extreme fineness of certain material particles; while, by experiment, it is shown that there is no practical limit to the divisibility of even the most solid substances. Thus, an ounce-weight of silver, gilt over with eight grains of gold, has been drawn out into a wire 13,000 ft. long, which was all its length covered with the gold; and a tube of glass presented to the blow-pipe has been drawn out till it became as fine as a silk fiber, or $\frac{1}{3000}$th of an inch thick, still retaining its character as a tube with a distinct interior and exterior surface. In fact, in theory, great and small are mere terms of relation; under the microscope, objects invisible to the eye appear of considerable bulk; and as sir John Herschel, in his celebrated *Introduction to the Study of the Physical Sciences*, has put it, there is no reason why a mote in a sunbeam should not be in itself a world. With regard to the indefinite divisibility of space, it may be demonstrated geometrically; and perhaps, after all, it is the feeling that space is infinitely divisible, which compels our minds most strongly to resist the notion of ultimate atoms with definite forms, as conceived in the corpuscular theory.

DIVISIBILITY, in the theory of numbers, means the capability of any number of being divided by another without remainder. To find the condition of divisibility of one number, N, by another, D. Let $N = b_m r^m + b_{m-1} r^{m-1} + \ldots b_1 r + b_o$. See NOTATION. Then $N = b_m (D + (r = D),^m + b_{m-1} (D + r - D)^{m-1} + \ldots + b_1 (D + r - D) + b_o$. Expanding the different terms of the right-hand side of this equation, it will appear that $\frac{N}{D}$ will be a whole number, if $b_o + b_1 (r - D) + \ldots + b_m (r - D)^m$ be divisible by D. Hence, if $r = 10$, or the number be in the denary scale, and $D = 9$, and therefore $(r - D) = 1$, any number will be divisible by 9, if $b_o + b_1 + b_2 + \ldots + b_m$ is so, or if the sum of its digits is divisible by 9.

DIVI'SION, one of the four principal rules of arithmetic, is that by which we find how often one quantity is contained in another. It is a compendious method of subtraction, by which we can at once take one number from another as often as it is contained in it. There are three numbers concerned in D.: the dividend, or number to be divided; the divisor, or that by which the dividend is to be divided; and the quotient, or the number expressing how often the divisor is contained in the dividend. The symbols of D. are $b) a$ (, $\frac{a}{b}$, or $a \div b$, where a is the dividend, and b the divisor.

There are various methods of D., such as the English, Flemish, Italian, Spanish, German, and Indian methods, which differ merely in the manner of arranging and disposing the numbers. The English method will be found explained in all the ordinary text-books of arithmetic. There are also rules of D. for the D. of integers, fractions, and algebraical quantities. The general rule for the D. of vulgar fractions is to multiply the one by the reciprocal of the other. The D. of decimal fractions is performed in the same way as the D. of integers. And, in algebra, D. is practically performed as in arithmetic, either by making a fraction of the dividend and divisor, and reducing the numerator and denominator by the parts common to both, or else by dividing the former by the latter, after the manner of long division. See any text-book on algebra. For D. by logarithms, see LOGARITHMS.

DIVISION, BENEFIT OF. By the law of Scotland, co-cautioners are each ultimately liable for the whole debt which they have guaranteed. Each, however, is liable only for his own proportion, so long as the others are solvent, provided he has not expressly renounced that privilege, or is not bound conjunctly and severally with the principal debtor, and the debt must thus be divided amongst them. The law of D. is not affected by the mercantile law amendment act; and it is therefore necessary, where there are more cautioners than one, that all should be proceeded against.

DIVISION, MILITARY, is one section of an army, indefinite in point of numbers, but established as a matter of convenience. It often comprises infantry, cavalry, and artillery, and is in effect a small army in itself, commanded by a general officer. In the Crimean war, for instance, a British D. comprised two brigades, each of three or four battalions.

DIVISION, MILITARY (DISTRICTS, MILITARY, *ante*). For convenience and to fix responsibility, the United States is divided into military divisions, viz.: 1. Division of the Missouri, comprehending the departments of Missouri, Dakota, Texas, and the Platte; head-quarters Chicago. 2. Division of the Pacific, including the departments of California, Columbia, and Arizona; head-quarters San Francisco. 3. Division of the Atlantic, including the departments of the east, the south, and West Point; head-quarters New York.

DIVISION, NAVAL, was a secondary group of ships in a large fleet, generally three to a squadron. In a very large and complete fleet, there might be as many as nine admirals or flag-officers commanding nine divisions, in three squadrons of three divisions each. The distinction of squadron has now been abolished, and individual ships are too gigantic to allow of large numbers being maneuvered in one fleet.

DIVISION OF LABOR, or DIVISION OF EMPLOYMENT, a term often used by political economists to express a means by which labor is economized, or, as another method of stating the same result, by which production is increased. The problem in division of labor is so to adjust matters in any given community that each member of it shall work, or be able if he pleases to work, with the greatest possible results. In practice it is, like most other arrangements, apt to be too broad or too narrow. The old term, "jack of all trades and master of none," expresses the truth, that people who try too many things are not likely to be adepts in any. On the other hand, few people can do any sort of work to great perfection, unless it is part, as it were, of a group of functions for which they are more or less prepared. A good dentist will be in some measure a surgeon; a conveyancer or a special pleader will know something of the other departments of legal practice; a shipwright will be able, on occasion, to do other kinds of carpentry, and he will be the better of a general knowledge of the mechanical powers. That division of labor, in fact, which is really productive, is where a man who can do several things selects one as that which he can do best, or has most opportunity of doing. By constant practice at that one thing, and the withdrawal of his attention from other matters, he achieves perfection and rapidity of execution. There is an important difference between this selection of a special pursuit, and the inability to do anything more than one thing, which is often confounded with it. In the former case, the worker, whether with head or hand, has great resources, for his adopted pursuit is the best out of several others, on which he can fall back. The man who can do only one thing is in a precarious condition, because that one thing may be superseded. Indeed, as the one thing which can be so done is generally a very simple thing, it is almost a law in political economy that it will come to be superseded by machinery. Such was the fate of the hand-loom weavers, whose function, especially in the plainer and lighter fabrics, was too easy to last. Of the division of unskilled and easy labor, there is an excellent illustration in Adam Smith's description of pin-making: "One man draws out the wire, another straights it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on is a peculiar business; to whiten the pin is another; it is even a trade by itself to put them into a paper; and the important business of making a pin is in this manner divided into above eighteen distinct operations, which in some manufactories are all performed by distinct hands." This division was doubtless useful, so long as pins were made entirely by human hands. It prompted serious inquiries, however, how far such functions were of an improving or a deteriorating character, and essays were written to prove that in manufacturing countries human beings were deteriorating, as no one of them had the faculty of self-support in separation from his fellows, and none could even make one single article by himself, all being dependent for their bread on a complex co-operation, which might break down any day. The answer to such fears may be found in the pin-making of the present day, where one man tends a machine, feeding it with wire at one end, while the pins drop out at the other. This, too, is the fruit of division of labor, for many skillful heads and hands have been occupied in bringing to perfection the different parts of the machinery. It is of the highest importance to the working-classes of a country, to keep in view that though the division of labor does sometimes create functions which, while they are extremely simple and easy, are of value as helping other functions to go on, yet this kind of easy and uniform work has no stability in it, and the possession of the facility for doing it acquired by practice is no permanent industrial endowment, since it is pretty sure some day to be superseded by machinery.

DIVI'SOR. See DIVISION. See also PRIME NUMBERS.

DIVORCE is defined by a Scottish writer to be "the disruption, by the act of the law, of the conjugal tie, made by a competent court on due cause shown."—Fraser, *Pers. and Domestic Relations*, i. 645. This definition correctly expresses the law of D. as it

now stands in the United Kingdom. There are some differences of detail in the working of the law in England and Scotland, which will be noticed below.

The desire to obtain a release from the matrimonial bond has existed at all times and under all legal systems. In heathen nations this release was often granted on the slightest grounds. Even among the Romans, marriage was regarded as little more than a conventional union, to be observed so long only as it suited the mutual convenience of the spouses. Christian nations, on the other hand, adopting as the basis of their systems the Scriptural law as declared Matt. xix. 9, Mark x. 9–11, Luke xvi. 18, and 1st Cor. vii. 10, 11, are agreed in considering marriage a sacred tie, not to be dissolved except on the ground of unfaithfulness to the marriage vow. Even this limited ground for dissolution of marriage is denied by a large portion of the Christian world. By the civil law, as it existed for some centuries after Christianity, a greater laxity was allowed in regard to divorce. The emperor Constantine was the first to prohibit dissolution of marriage by simple consent of the parties. This practice was again revived under the emperors Theodosius and Valentinian; and though those emperors subsequently rescinded this edict, yet the rule as to the grounds on which marriage might be dissolved continued to fluctuate. By the canon law, marriage was regarded as a sacrament; and though marriages contracted in disobedience to certain rules might be declared null *ab initio*, a marriage validly contracted would not be dissolved except by papal dispensation. But the rule of the canon law was not uniformly adopted by the states of Europe, and it was not till the famous council of Trent issued a decree, in its 24th session, in 1562, declaring marriage indissoluble even after the adultery of one or both of the parties, that a uniform rule on the subject was established. But before this decree was issued, the reformation had made progress throughout Europe, and thus a change again took place in regard to the law of divorce. It should be observed, that though by the canon law D. *a vinculo matrimonii* was unattainable, parties might obtain a separation *a mensâ et thoro*. The nature of this remedy will be explained below.

Roman Catholic countries adopted the principle laid down by the council of Trent, and this rule continues to be in force in most countries which are in the Roman Catholic communion. But by the code civile of France, D. is allowable on the ground of adultery and certain other causes. Countries which adopted the reformed religion, have varied greatly in the rules established in regard to the question of divorce. In Holland D. is permitted on the ground of adultery and desertion. In America, the practice varies in different states. "In several of them no D. is granted but by special act of the legislature, according to the English practice; and in others, the legislature itself is restricted from granting them, but it may confer the power on courts of justice. So strict and scrupulous has been the policy of South Carolina, that until recently there was no means of obtaining a D. of any kind, either by sentence of a court of justice or by act of the legislature. In all other states, D. *a vinculo* may be granted by courts of justice for adultery. In New York, the jurisdiction of the courts as to absolute D. for causes subsequent to marriage is confined to the single cause of adultery; but in most of the other states, in addition to adultery, intolerable ill-usage or willful desertion, or unheard-of absence, or habitual drunkenness, or some of them, will authorize a decree for D. *a vinculo* under different modifications and restrictions."—Kent, *Comm.* iv. 105. In England, previous to the passing of the late divorce and matrimonial act, marriage was by the common law indissoluble. It was, indeed, competent to obtain a declaration of nullity of marriage on the ground of relationship, previous marriage of one of the parties, mental or physical incapacity, or coercion. But the judgment so obtained was not a decree of D., but a declaration that the marriage tie between the parties had never really been contracted. A wife may now obtain a D. on the ground of the husband's incestuous adultery; or of his bigamy with adultery; or of rape; or of sodomy; or of adultery coupled with gross cruelty; or of adultery coupled with desertion without reasonable excuse for two years. The husband may obtain a D. on the ground of the wife's adultery. But neither party can obtain a D. on the ground of mere desertion alone, however long continued. The court may order the husband to pay a divorced wife a certain sum for her maintenance during their joint lives. A decree of D. does not come into full force until six months after it is pronounced. The bars to a D. are condonation, connivance, or collusion. When divorced, the parties are at liberty to marry with third parties. When the D. is on the ground of adultery, both parties may be examined as witnesses, 32 and 33 Vict. c. 68.

In Scotland, D. may be obtained on the ground of adultery or willful desertion. Immediately after the reformation, the courts in Scotland recognized the right of either spouse to obtain a D. on the ground of adultery. And in the year 1573, a statute was passed declaring that, in case either husband or wife should desert without due cause for four years, the injured party might raise an action of adherence, and, in case redress was not obtained, a decree of D. might be pronounced. In Scotland, it is not permitted that a marriage should take place between the offending parties. The effect of a decree of D. on the pecuniary interests of the parties, is to cause the offender to forfeit all benefit which might accrue to him or her from the marriage. Separation *a mensâ et thoro* may also be obtained in Scotland on the ground of ill usage, and perhaps desertion (q. v.). Condonation and collusion, but not recrimination, are, in Scotland, a bar to obtaining a dissolution of marriage on the ground of adultery.

DIVORCE (*ante*) in this country depends upon the statutes of the several states, and there is great variety among them. In South Carolina a divorce is not allowed for any cause; in New York for adultery only; but in most of the states it may be granted for several causes, as adultery, cruelty, willful desertion for a certain period, habitual drunkenness, etc. In some states the matter is left wholly or in part to the discretion of the court. The principal defenses in suits for divorce are the same as in the English courts. The consequences of divorce are such as flow from the sentence by operation of law, or flow from either the sentence or the proceeding by reason of their being directly ordered by the court and entered of record. In regard to the former, they are chiefly such as result immediately and necessarily from the definition and nature of a divorce. Being a dissolution of the marriage relation, the parties no longer have any of the rights nor are they subject to any of the duties pertaining to that relation. They are thenceforth single persons to all intents and purposes. It is true that the statutes of some of the states contain provisions disabling the guilty party from marrying again; but those are in the nature of penal regulations, collateral to the divorce, and which leave the latter in full force. In regard to the rights of property as between husband and wife, a sentence of divorce leaves them as it finds them. Consequently all transfers of property which were actually executed, either in law or in fact continue undisturbed; forexample, the personal estate of the wife reduced to possession by the husband, remains his after the divorce the same as before. But it puts an end to all rights depending upon the marriage, and not actually vested; as, dower in the wife, all rights of the husband in the real estate of the wife, and his right to reduce to possession her right to collect debts or damages for breach of contract. In New York, however, with respect to dower it has been settled that immediately upon marriage being solemnized the wife's right to dower becomes perfect, provided only that she survives her husband. Alimony during proceedings for divorce is a frequent question, usually in the discretion of the court. The custody of children is another and more important question. The general principle is to consult the welfare of the child rather than any supposed rights of either parent; but in considering the rights of parents the innocent parent is preferred before the guilty. In the absence of a controlling necessity, or very strong propriety arising from the circumstances of the case, the father's claim has preference.

DIVORCE AND MATRIMONIAL COURT. An act of parliament of 1857, with amending acts, changed the law of England on the subject of divorce. By the first of these acts, the jurisdiction in divorce causes is transferred from the ecclesiastical courts to a new court constituted for the purpose, which, since the judicature act (1873), is included in the probate, divorce, and admiralty division of the high court of justice. It is provided that either spouse may obtain a divorce on the ground of adultery; but in case the wife is petitioner, the adultery must be accompanied by cruelty or desertion. By 23 and 24 Vict. c. 144, the power to pronounce a decree of divorce, which was at first reposed in the whole court, is given to the judge who hears the cause; but in this case the decree so pronounced is a decree *nisi*, and cannot become final for at least six months. After decree of divorce, the offending party is free to marry again even with the paramour. But it is enacted, 20 and 21 Vict. c. 85, sect. 57–58, that no clergyman shall be compelled to solemnize the marriage of any person who has been divorced. He must, however, allow another clergyman, if willing to do so, to perform the marriage. A party applying for a divorce will not be allowed to obtain judgment, should it appear that he or she has been guilty of recrimination by committing the same offense, or that there is collusion between the parties in order to procure the divorce. Parties also who have condoned the offense—that is, who after it has been discovered have consented again to live as husband and wife—will not be allowed to obtain a divorce. In order to guard against fraud by parties conniving to procure a divorce, power is given to the queen's proctor, by 23 and 24 Vict. c. 144, to interpose, in case he have reasonable ground to suspect collusion or recrimination, in order to oppose a petition for divorce. By these acts, parties are also entitled to obtain a judicial separation on the ground of adultery, cruelty, or desertion. Judicial separation is declared to be in place of a seperation *a mensâ et thoro*. A married woman, having obtained decree of judicial separation, is declared to be in all respects as a *feme sole* in regard to any property that she has or may acquire. Even before obtaining a separation, a woman deserted by her husband may obtain from the court a protection for any property which she may acquire by her own industry.

From the conflict of laws in various countries on the subject of divorce, questions have frequently arisen as to the competency of a sentence of divorce by a tribunal having power according to the *lex loci* to pronounce such sentence, to annul a marriage contracted in a country where such divorce is not allowed. It appears now to be the generally received opinion, that wherever parties are domiciled they will be allowed to avail themselves of the laws of this domicile. But the courts will not recognize a transient visit to a foreign country as sufficient ground to sustain a divorce. On the subject of this article, see Paterson's *Compendium of English and Scotch Law;* Fraser's *Personal and Domestic Relations;* and Swabey *On the Divorce and Matrimonial Act.*

DIX, Dorothea Lynde, b. Mass., 1794. She established a school for girls in Boston, and took much interest in the unfortunate and criminal classes. In 1834, she went

to Europe to study methods of the treatment of paupers, criminals, and insane persons. After a great deal of exertion she induced congress to pass a bill granting ten millions of acres of land to endow hospitals for the indigent and insane, but the measure was vetoed by president Pierce. During the rebellion she was superintendent of hospital nurses for the union army. Among her publications are *Garland of Flora; Private Hours; Alice and Ruth; Conversations about Common Things;* and *Prisons and Prison Discipline.*

DIX, JOHN ADAMS, LL.D., 1798–1879; b. N. H.; a politician and soldier. In the war of 1812, he served as an ensign on the Canada frontier. In 1828, he began the practice of law in Cooperstown, N. Y., and became one of the leaders of the democratic party. In 1830, he was adjutant-gen. of the state, and in 1833, secretary of state and superintendent of common schools. He was chosen member of the assembly in 1842, and in 1845, appointed to fill a vacancy in the U. S. senate. In 1848, when the democratic party divided on the question of the extension of slavery, he went with the "free soil" wing and was their candidate for governor, but was not elected. In 1853, he was assistant treasurer of the United States in the city of New York. In 1860, he was chosen secretary of the treasury. Secession was just beginning, and New Orleans was substantially in the hands of the confederates. Two revenue cutters there were ordered to New York by the secretary. The captain of one of them refusing to obey, secretary Dix immediately telegraphed to have him arrested and treated as a mutineer if he offered any resistance, closing the dispatch with the words: "If any man attempts to haul down the American flag, shoot him on the spot." In 1861, Dix was appointed maj.gen. of militia, and the same year maj.gen. of U. S. volunteers. In 1862, he was placed in command of the department of Maryland, and about the same time was sent to Fortress Monroe in command of the seventh army corps. He was in command in New York city at the time of the riots, July, 1863, and in 1864–65, commanded the department of the east. In the autumn of 1866, he was minister to France, and resigned, 1868. In 1872, the republican party elected him governor of New York. He retired in 1875, and passed the remainder of his life in private. Besides miscellaneous papers he was the author of *Resources of the City of New York; Decisions of the Superintendents of Common Schools of New York, and Laws relating to Common Schools; A Winter in Madeira; A Summer in Spain and France;* and two volumes of speeches.

DIX, MORGAN, S.T.D., b. New York, 1827; son of John A.; a clergyman of the Protestant Episcopal church, graduate of Columbia college and of the Protestant Episcopal general theological seminary. He was ordained in 1853, and in 1855, became assistant minister of Trinity church, New York. In 1859, he was assistant rector of the parish, and in Nov., 1862, after the death of Dr. Berrien, he succeeded as rector, where he still remains. He has published, among other works, *A Commentary on the Epistle to the Romans; An Exposition of the Epistles to the Galatians and Colossians; Lectures on the Pantheistic Idea of an Impersonal Substance Deity; Essay on Christian Art;* and *Lectures on the Two Estates*, that of the *Wedded in the Lord*, and that of the *Single for the Kingdom of Heaven's Sake.*

DIXIE, a popular name for the Southern states of the American union, much in use about the time of the attempted secession. It seems to have been adopted from a song of the slaves which set forth the delights of a region where they were under a good master—the region being called Dixie's Land, from a well-known kindly slave-holder of that name. The old song, or one based upon it, became widely favored as a sectional rival of *Yankee Doodle.*

DIX ISLAND, off the Maine coast, about 10 m. s.e. of Rockland; a remarkable deposit of excellent granite, from which the New York post-office, the treasury building at Washington, and many other fine public buildings have been constructed. There are probably 1500 men and one or two hundred women and children on the island. Quarrying is the only business.

DIXON, a co. in n.e. Nebraska, bordering on the Missouri river; 700 sq.m.; pop. '76, 3,263. It has a level surface and fertile soil. Agriculture is the chief business. Co. seat, Ponca.

DIXON, a city, seat of justice of Lee co., Ill., on Rock river, at the crossing of the Chicago and Northwestern and the Illinois Central railroads; 98 m. w. of Chicago; pop. 4,055. It has good water-power, and a number of manufactories.

DIXON, JAMES, D.D., 1788–1871; an English Methodist preacher of the Wesleyan conference. In 1824, he was a missionary at Gibraltar; 1828–33, a preacher in London; afterwards in Liverpool, and superintendent of the Sheffield and Manchester circuits. In 1841, he was president of the British conference, and in 1848 was sent by the Wesleyan body as delegate to the general conference in the United States. He published *Methodism in its Origin, Economy, and Present Condition; Notes on America; The Present Position and Aspects of Popery, and the Duty of Exposing the Errors of Papal Rome*, etc.

DIXON, WILLIAM HEPWORTH, an English author, was born in the West Riding of Yorkshire in 1821, and settled in London in 1846, where he soon acquired a considerable reputation by his writings. A series of papers published in the *Daily News*, "On the Literature of the Lower Orders," and another on "London Prisons," attracted

considerable attention. The latter reappeared in a volume published in 1850. Before this, but in the same year, he published *John Howard, and the Prison World of Europe*. It was with difficulty he could induce the publisher to accept it, yet when published, it went through three editions in one year. D. now devoted himself principally to historical biography. In 1851, appeared the first edition of his *William Penn*, a work called into existence by the onslaught made by Macaulay on the eminent Quaker, in which D. undertook to disprove Macaulay's charges. In 1853 was published his *Life of Blake;* and in the same year an anonymous pamphlet, entitled *The French in England*, designed to allay the fear of a French invasion then prevalent. In 1853, D. was appointed editor of the *Athenæum*—a chair he vacated in 1869. In 1860, he published his *Life of Lord Bacon*, and in 1863, *The Holy Land*. He gave the public *New America* in 1867; *Spiritual Wives* in 1868; *Free Russia* in 1870; *The Switzers* in 1872; *History of Two Queens* in 1873–74; *White Conquest* in 1875; and *British Cyprus* in 1879.

DIXON'S ENTRANCE, a strait of 100 m. in length from e. to w. on the n.w. coast of America, divides Queen Charlotte island on the s. from the Prince of Wales archipelago on the north. It is, therefore, of some political importance, as separating the British possessions in this quarter from those of the United States. Lat. 54° 30′ n., and long. 132° west.

DIXWELL, JOHN, 1609–89; of a good family in Kent; one of the judges of Charles I. After the accession of Charles II. he was condemned to death, but fled to America, and lived undiscovered in New Haven, under the assumed name of John Davids.

DIZFUL, a t. of Persia, on the river Dizful, in lat. 32° 10′ n., and long. 48° 34′ east. It is the capital and principal mart of its province (Khuzistan). A handsome bridge of twenty arches crosses the river here. The foundation is of stone and of ancient date, the upper portions are of brick and are modern. Pop. estimated at 15,000.

DIZIER, ST., a t. of France, in the department of Haute-Marne, 10 m. n. of Vassy, is situated on the Marne, which here begins to be navigable. It is a very long and narrow, but well-built town, the streets being wide, clean, and regular. In 1544, D. resisted for a month the assaults of a Spanish army under Ferdinand de Gonzaga; a resistance of the greatest consequence to the French ruler, Francis I., the delay enabling him to collect his forces to oppose the march of the Spaniards upon Paris. In 1814, the French twice defeated here the invading army of the allies. The chief industrial features of the place are iron forges and foundries, boat-building yards, in which a great number of river and canal boats, generally of about 100 tons, are constructed, and cotton factories. There is also a considerable trade in wood, iron, and grain. Pop. '76, 9,453.

DJEZZAR, i.e., *Butcher*, the name given, on account of his cruelty, to Achmed pasha, famous for his obstinate defense of Acre against Napoleon I. He was born in Bosnia about 1735, and rose, through murder and treason, from the condition of a slave to the pashalic of Acre. In the beginning of 1799, the French entered Syria from Egypt, and advanced from victory to victory till they reached Acre, which was laid siege to on the 20th Mar. By the advice of col. Philippeaux, a French émigré, and of sir Sydney Smith, the commander of the British fleet in the Levant, D. was induced to hold out; and such was the savage doggedness of his resolution, that Bonaparte was obliged to retire on the 21st of May. It is said that during the siege he sat on the floor of his palace, surrounded by a heap of gory skulls, distributing money to all who brought in the heads of Frenchmen. He died at Acre in 1804. D. was at times maniacal in his cruelties. He whipped off the heads of his wives without the slightest ceremony—seven at a time! But he had also moments of remorseful tenderness, in which he helped the poor and provided for those he had injured. He is said to have possessed the sharpest discernment, and was a very vigorous ruler.

DMITROV, an ancient t. of Russia, on the Jakhrama, an affluent to the Volga, 40 m. n. of Moscow. It covers a large area, a considerable part of which is occupied by gardens, but as a whole is poorly built. It contains a college and seven churches, and has manufactures of silk and cotton goods, tanneries, etc. Pop. '67, 8,042.

DNIE'PER, one of the large rivers of Europe; has its source in certain swampy forestlands in the n. of the Russian government of Smolensk. Its general direction, until it reaches Kiev, is south. From Kiev, its course is s.e. to Ekaterinoslav, where it turns directly s. past Alexandrovsk, below which town it sweeps round to the s.w., and pursues that direction until it debouches in the Black sea, between the governments of Kherson and Taurida, its embouchure forming a gulf of about 50 m. in length, with a breadth of from 1 to 6 miles. Its principal affluents are the Desna and Soj from the e., and the Pripet, the Beresina, and the Druz from the west. The total length of the D. is upwards of 1000 m., and it is navigable almost from its source, its breadth at Dorogobush, about 50 m. below its source, being 210 feet. Some of the finest governments of the Russian empire lie within its basin, with all of which its navigable branches and canals enable it to hold communication. In its upper part, it flows through a marshy forest territory; its middle and lower course is rocky. Below Ekaterinoslav, indeed, there are no less than 13 rapids in the course of about 40 m.; but these impediments to navigation have been overcome in part by blasting, and by splendid hydraulic-works erected by the Russian government. The produce of the provinces, consisting for the most part of corn, timber, iron, salt,

hemp, and linen, are usually conveyed down the river to ports on the Black sea, but many vessels pass annually from the D. to the Baltic by the Beresina and the Dwina. At Smolensk, the waters of the D. are frozen from Nov. to April; at Kiev, they are ice-bound only from Jan. to Mar. Sturgeon, carp, and pike abound in the river. As the *Borysthenes* the river was known in the 7th c. B.C. to the Greeks, who regarded it as the most valuable river on earth next to the Nile.

DNIE'STER, a river of Europe, flowing chiefly through Russia, but having its rise in the Carpathian mountains, in the Austrian crown-land of Galicia, about lat. 49° 10′ n., long. 23° east. Its general course, until it reaches the Russian territory, is s.e.; it then runs e. for a short distance, and thence s.s.e., forming the boundary between Besserabia and Kherson, past Mohilev, Dubossari, and Bender, to the Black sea, which it enters by a shallow shore lake, 19 m. in lengt hand 5 in breadth, between Akerman and Ovidiopol. The total length of the D. is between 500 and 600 m., its current throughout being very rapid. Until it reaches the Russian frontier, its right bank is skirted by offsets from the Carpathians; but at that point, the country, which above has been level on only one side, opens into a broad flat plain, through which the river, broken at intervals by masses of rock, rushes muddy and turbid. The downward navigation is interrupted by a series of falls and whirlpools. Wood and grain are the chief products conveyed down the river.

DÖAB', a word of Sanscrit origin, signifying primarily "two rivers," but applied, like the Gr. *mesopotamia,* and the Lat. *interamna,* to the country between two rivers. The two roots of the word are common to all the Aryan languages: the first appears in Lat. *duo,* Eng. *two;* the second in Celt. *avon,* a river, and in Dan*ube* or Don*au*. Punjab ("five rivers") is a term of the same kind; but while Punjab exists merely as a proper name of one particular region, Döab is used as the common appellation of any region in general that fulfills the conditions. When introduced, however, without local reference of any kind, the Döab means the space inclosed by the Jumna on the s.w. and the Ganges on the n.e.—a space extending from Allahabad to the base of the Himalayas, a distance of upwards of 500, with an average breadth of 55 miles. The fertility of this region has been much increased by the Ganges canal (q.v.).

DOANE, GEORGE WASHINGTON, D.D., LL.D., 1799–1859; b. N. J.; graduate of Union college in 1818; ordained 1821, and rector for three years in Trinity (Prot. Ep.) church, New York. He was assistant minister and rector of Trinity church, Boston, 1828–32, and was then chosen bishop of New Jersey. While in this office he made special efforts for higher Christian education, and opened St. Mary's Hall at Burlington, on the Delaware river, a boarding-school for girls. In 1846, he founded Burlington college. His denomination flourished greatly under his episcopate. He published a volume of poems and a volume of sermons.

DOBCHICK. See GREBE.

DOBELL, SYDNEY, a modern English poet, was b. in London in 1824. His father, who was a wine-merchant, removed to Cheltenham in 1835. Here D., whose education was entirely private, lived till 1850, when the *Roman* was published, and received with favor by the literary world. After the publication of this poem, D. resided for some time in Switzerland. Shortly after his return, the delicate state of his wife's health brought him to Edinburgh, where he remained till 1857. He afterwards resided on the Cotswold hills, near Gloucester. Besides the *Roman,* D. published *Balder* (1854), *Sonnets on the War,* in conjunction with Mr. A. Smith (1855), and *England in time of War* (1856). His poems exhibit a singular mixture of the philosophical and the poetical spirit. Many of his passages are as spiritual in conception and lavish in imagery as the finest portions of Shelley; others, again, are as obscure, intricate, and involved as the rhymed enigmas of Cowley or Donne. In 1865, D. published a political pamphlet advocating a graduated suffrage and plurality of votes; and in 1871, *England's Day,* a lyric. He died in 1874. A collected edition of his poems was published in 1875; and in 1876, *Thoughts on Art, Philosophy, and Religion.* See *Life and Letters of Sydney Dobell* (1878).

DÖ'BELN, a t. of Saxony, 36 m. s.e. of Leipsic, is situated on an island formed by the Mulde. It is well built, and contains a richly endowed hospital. Its chief manufactures are linen, woolen, and cotton cloth, brass-ware, and hats. D. has also several bleach-fields and worsted mills. Pop. '75, 10,969.

DOB'RIZHOFFER, MARTIN, 1717–91; a Jesuit missionary in Paraguay, where he labored many years among the native tribes. When the order was expelled from South America, he settled in Vienna, and enjoyed the friendship of Maria Theresa. He wrote a garrulous history of his missionary work in South America.

DOBROW'SKI, JOSEPH, the founder of Slavic philology, was b. Aug. 17, 1753, at Gyermet, near Raab, in Hungary, where his father, a Bohemian by birth, was stationed in garrison. He studied at the gymnasium of Deutschbrot, and subsequently at Klattau and Prague. In 1772, he entered the order of the Jesuits at Brünn, but on its dissolution ten months after, he returned to Prague, to continue his theological studies, and in 1776, became tutor in the family of the count von Nostitz. During the years 1780–87, he edited a critical journal of Bohemian and Moravian literature. This soon involved him in various strifes, and ultimately the review was "stopped" by the

authorities, but not before it had added largely to D.'s reputation. In 1792, at the expense of the royal Bohemian scientific society, he made a journey to Denmark, Sweden, and Russia, to search after the fate of those Bohemian books and MSS. which the Swedes had carried off from Prague during the thirty years' war. Two years after, he traveled through Germany, Italy, and Switzerland. On his return, he manifested symptoms of a disordered mind, and in 1801, had to be confined for some time. He speedily recovered, but was subject to intermittent fits of insanity until his death, which happened Jan. 6, 1829. D. is reckoned one of the highest, if not the very highest, authority on all matters connected with Bohemian history and literature. His principal productions are—*Scriptores rerum Bohemicarum* (Prag., 2 vols., 1783–1784); *Geschichte der Böhm. Sprache und ältern Literatur* (Prag. 1792); *Die Bildsamkeit der Slaw. Sprache* (Prag. 1799); *Deutsch-Böhm. Wörterbuch* (2 vols., Prag. 1802–21), in which he was largely assisted by other eminent Bohemian scholars; *Lehrgebäude der Böhm.-Sprache* (Prag 1809); and *Institutiones Linguæ Slavonicæ Dialecti Veteris* (Vienna, 1822).

DOBRUDSCHA, or DOBRUDJA (anciently *Scythia Minor*), a region formerly Turkish, now belonging to Roumania, lies between the lower Danube and the Black sea; the Berlin congress of 1878, in transferring it to the principality, fixed the southern limit, formerly somewhat indefinite, at a line from Silistria on the Danube to Mangalia on the sea-coast. The n.e. of this region is occupied by marshes and the delta of the Danube; the rest of the area is partly steppe and partly cultivated corn-land. The inhabitants comprise a few Bulgarians and Roumanians, Tartars, Circassians, Osmanli Turks, Greeks, Armenians, and Jews. Salt is manufactured, and fishing carried on.

DO'CE RIO, a river of Brazil, about 500 m. in length; rising near the city of Ouro Preto, in the province of Minas Geraes, running n. 150 m., then e. and s.e., and then n.e. through the province of Espirito Santo, then turning to the s.e. and emptying into the Atlantic near Regencia. It is navigable in only small portions; the banks are steep, and bordered by mountains covered with deep forests.

DOCE'TÆ (from the Gr. *dokeō*, to appear or seem) was the name given in the early church to those heretics who held that the human nature of Jesus Christ was a semblance and not a reality. The philosophers of polytheism, as well as of Judaism, had explained the appearances of divinities and of angels by holding that the assumption of bodies was only momentary, or in appearance. And when the Gnostic Christians found it impossible to conceive the essential union of the divine nature with a body composed of matter, which they held to be the seat of all evil, they had recourse to the same expedient. The difficulty was got over in one of three ways: the body of Christ was either considered a real earthly body, but not belonging essentially to his nature, and only assumed for a time; or it was declared to be a mere appearance or illusion; or, finally, it was believed to be a heavenly body, composed of ethereal substance, though having the appearance of being material. All the Gnostic heretics held docetism in one or other of these three forms, with the exception of those who were led by the same difficulty to deny the divine nature of Jesus Christ, and reduce him to a mere human sage. While the first of these alternative forms of heresy seems to have completely died out, the last, under various names, has continued to the present time. For a clear and learned account of docetism, consult Neander's *Dogmengeschichte* (History of Doctrine). English by J. E. Ryland; published by H. G. Bohn, in 2 vols., 1858.

DOCK, *Lapathum*, a sub-genus of the genus *rumex*, the other species of which are generally called sorrel (q.v.), containing those which are not acid, and of which the flowers are hermaphrodite. They are large perennial herbaceous plants, natives chiefly of temperate climates, with large generally lanceolate or ovate leaves, and panicles of small greenish flowers. They have great tap-roots, and are with difficulty eradicated from pastures. They also multiply rapidly by seed. The best mode of dealing with them, is generally found to be repeated cutting away of their leaves and shoots, by which the plants are killed. Many of the species prefer watery places. A number are natives of Britain, and several of the European ones have found their way to North America, where they have become troublesome weeds, a number of really indigenous species being also found there. Useless and even troublesome as the D. is generally esteemed, yet the large astringent roots are capable of being beneficially employed in medicine; and those of the great water D. (*R. hydrolapathum*) in particular—for which the Druids entertained a superstitious veneration—are administered as an antiscorbutic. They are also employed in rheumatism, and sometimes as a styptic, sometimes to form an astringent gargle, and sometimes as a dentifrice. *R. alpinus* is called MONK'S RHUBARB, and its root was formerly employed instead of rhubarb, but is less powerful. It is a native of the Alps, and has been found in several places in Britain.—The roots of docks have been sometimes used in dyeing, and give "a great variety of shades, from straw-color to a pretty fine olive, and a fine deep-green to cloths which have been previously blued."

DOCK, an inclosure for the accommodation of shipping, and of which there are three kinds—viz., wet or floating; tidal, which may with more propriety be called harbors or basins; and dry or graving. Wet docks are for the purpose of maintaining a level nearly uniform with that of high-water, so as to keep vessels always afloat, and to save

them from rubbing up and down the quays with the rise and fall of the tide, and being sometimes too high and at other times too low for convenience in shipping or discharging cargoes.

Wet docks are generally surrounded by quay or wharf walls of masonry or brickwork, but where they are wanted chiefly for laying up vessels in, and not for loading or unloading, their margin is sometimes only a natural sloping beach. They are of most importance in places where there is a great rise and fall of tide, such as at Bristol or Liverpool, where they are almost indispensable; while, again, in the Clyde, where the tides are small, they have not long been erected, and are on a much more limited scale. Wet locks are generally entered by means of what is called a lock (see LOCK), having two gates, in one leaf, or more frequently in two folding-leaves each, which enables vessels to enter or depart for a considerable time before and after high-water; but frequently, for the sake of economy both in space and in cost, they have only one gate, so that vessels can only enter or depart at or very near high-water, unless the water in the D. be run down considerably below that level.

The water in wet docks is sometimes kept, by means of pumping, permanently at as high a level as that of the highest tides, when a supply of pure water can be procured, to prevent the silting caused by the admission of any considerable body of turbid water by the gates, but that involves the necessity of locking up or down always except at the highest tides. The tendency to silt up by deposits of fine mud is of common occurrence, and dredging, or some other plan, must be resorted to for the purpose of keeping the D. reasonably clear. In almost all cases, wet docks require to be occasionally emptied for the purpose of cleaning.

Dock-gates are generally opened and shut by means of chains worked by hand, either by winches or capstans; but of late years they have in some cases been moved by hydraulic machinery, as at Great Grimsby, the Victoria docks in the Thames, and Albert dock, Leith.

Tidal docks require no particular description; they are merely basins surrounded by quay walls, and having open entrances permitting the free flow and ebb of the tide, as at Greenock and Troon, and they have the advantage of requiring no opening or shutting of gates. With small tides, they answer very well, and they are sometimes made deep enough to keep vessels afloat at low-water; but with tides of considerable range they are attended with the disadvantage of large vessels grounding at low-water, and from the large volume of water, generally more or less turbid, which enters at every tide, they are much more liable to silt up than wet docks are. For ridding them of muddy deposits, the plan is sometimes resorted to of letting out a reserve of water with a sudden gush from an inclosure at the inner end, at the time the tide has receded. This is called scouring. Such is the process pursued at Boulogne and elsewhere.

The quays of wet and of tidal docks must have mooring-ports or rings for making vessels fast to. They are generally provided with sheds to keep goods dry, with cranes (see HYDRAULIC CRANE) for shipping or unloading heavy articles, and with staiths or drops in the case of coal-shipping ports, and now they very frequently have rails laid along them.

Dry docks are used for the purpose of laying vessels dry for examination or repairs. They may have their entrance either from a wet D. or from a tidal harbor; but the former is by much the better arrangement, as it admits of vessels being docked or taken out at any time of tide, and it keeps a more equal pressure on the gates, thereby making them less liable to leak. They require to be built of good water-tight masonry. The entrance has generally a pair of folding-gates pointing outwards, to exclude the water; but sometimes it is closed by means of a caisson—viz., a vessel shaped something like the hull of a small ship, and having a keel and two stems, which fit into a groove in the masonry. The caisson is sunk into the groove by admitting water into its interior, and is floated out again by pumping out the water. When the tides are very large, the bottom of the D. may sometimes be placed above low-water, so that it may be run dry without pumping; but generally the bottom of a dry D. for the reception of any but very small vessels is below that level, in which case a steam-engine and pumps, with a wall and water-channels leading to it, are required for emptying the dock. The floor is nearly level, and the keel of the vessel to be docked rests on wooden blocks fastened down to prevent them floating, and of such a height as to admit of the shipwrights getting under the vessel's bottom. Side-shores are put in, to keep the vessel in an upright position, and blocks are fitted in under the bilges as soon as possible after the water has been got out of the dock. The sides generally consist of stone steps called altars, for the purpose of fixing the lower ends of the shores, and also for the convenience of supporting the workmen's scaffolds. Dry docks are frequently made long enough to hold three or four vessels of considerable size at one time, in which case they are placed, not in the center line of the D., but obliquely across, so as to give more available length.

The use of the graving D. is frequently superseded by that of Morton's patent-slip. See SLIP. Graving-docks of large dimensions are very expensive works, and the difficulty of making them water-tight is very great. In many cases, therefore, recourse is had to a pontoon or floating-dock, sometimes termed a "camel." See FLOATING-DOCK. The use of the floating D., together with the application of hydraulic pres-

sure for the raising of ships, is to be seen at the "Thames graving-docks," where there are two rows of cast-iron columns, 5 ft. diameter, and 16 in each row. The rows are 60 ft. apart, and the practical working length is 350 feet. Each column incloses a hydraulic press of 10 in. diameter, with a length of stroke of 25 feet. There are cross-heads on the top of each ram, from the ends of which cross-girders extend across the D. to the corresponding column on the opposite side, which girders form a large wrought-iron gridiron or platform, which is raised or lowered at pleasure with the vessel upon it. When a vessel is to be repaired, an open pontoon is selected to suit its dimensions, which is sunk in position to the bottom of the D., and resting on the iron gridiron. After the vessel is floated over the pontoon, the whole is raised by the hydraulic presses, and the pontoon being emptied of water, sustains the weight of the vessel to be repaired, and is then floated away into some convenient part of the dockyard.

Liverpool has 20 graving-docks, many of them being 600 ft., and some even 750 ft. in length. No docks in the world are on so splendid a scale as those of London, Liverpool, and Birkenhead, which are of immense area, covering hundreds of acres. Surrounded with substantial stone quays, provided with gates, placed under a proper police, and otherwise managed in a costly manner, these, as well as nearly all other docks in Great Britain, require to be supported by rates levied from the vessels resorting to them; and for levying these rates, powers are taken in the acts of parliament authorizing the construction of the respective docks. Sometimes the D. dues or rates are imposed on vessels in bulk according to tonnage, and in other instances, the rates are so much per ton, according to the nature or value of the goods. See M'Culloch's *Commercial Dictionary*. Generally, the dues are complained of as being a heavy burden on commerce; but so enormous is the cost of constructing docks, that the joint-stock companies by which they are for the most part owned, do not often realize good returns for their investments. The most remarkable circumstance connected with English docks, is the rapid extension of the dock-system on the Mersey at Liverpool. The original old D. contained an area of 3 acres 1200 yards, and 557 lineal yards of quay space. The total quay space is now above 20 miles.

DOCK (*ante*). Docks in the United States are of not so much importance to commerce as in England, the rise and fall of the tide being far less. There is no difficulty in lading and unlading ships at the wharves of any of the Atlantic or gulf ports, and hence little need of inclosed docks. There are, however, some very fine docks for the more convenient handling of merchandise, especially of grain, sugar, cotton, etc., and for the care of valuable goods. The Atlantic docks in Brooklyn are a specimen. For the repair of vessels, the lifting dock is most in use, and generally hydraulic power is used. The graving-dock in the government navy-yard at Brooklyn is one of the finest in the world, though built on a most difficult foundation. The floor is an arch, upside down; the mason work is granite-faced, and the facing stones weigh as much as three tons. The gates are of iron, and with apparatus for opening and closing them, weigh about 400,000 lbs. The floating caisson is of iron, and weighs over 420,000 lbs. besides ballast. There is pumping power sufficient to empty the dock in two hours. The principal measurements are: length and breadth of main chambers, at bottom, 286 by 30 ft.; at top, 307 by 98. The caisson added makes the extreme length 359 feet. This dock cost over $2,000,000.

DOCKET. See DOQUET, *ante*.

DOCK WARRANTS are orders or authorities for the removal of goods and merchandise warehoused in the various docks. The orders are granted by the proper officer at the docks, on application of the importer, in favor of any one whom the latter shall name. Careful rules as to obtaining warrants are laid down by the East and West India dock and the London dock companies. These rules are, in a great measure, followed by the other dock companies in the kingdom. Unless the rules are complied with, goods will not be delivered from the docks. Warrants may be obtained for either the whole or a part of a cargo consigned. A warrant may be assigned by the holder. A single warrant may also, at the desire of the holder, be divided into smaller warrants, and these also may be assigned. In case a warrant is lost, a new warrant will not be issued till the loss has been advertised, and the holder furnish the company with an engagement to indemnify them for any loss which may arise.

DOCK-YARD BATTALIONS, prior to the establishment of volunteer corps, formed a special element in the British military service, intended chiefly for the defense of the royal dock-yards. It was in 1847 that an item first appeared in the estimates of £20,000 for training and exercising about 9,000 men in these battalions. Clerks, artisans, and laborers formed the body. The col. was a naval officer, and commissions were given to the other officers. The men received remuneration for time lost in drilling. A few hours per week in summer were set apart for drilling under the management of sergeants and corporals of marines. At first, the enlistment was voluntary; afterwards, compulsory. These battalions were abolished in 1861.

DOCK-YARDS, ROYAL. Under the names of the several towns where the royal dock-yards are situated, will be found brief notices of those establishments. Under the present heading, a few remarks may be useful concerning the whole of them collectively.

Most of the royal ships are built by the government, at one or other of the dock-yards at Portsmouth, Plymouth, Sheerness, Chatham, or Pembroke. Each of these establishments comprises covered slips on which the ships are built, docks in which they are kept, and all the appliances for rigging them out for sea. Boat-building and mast-making are also carried on; and in some, though not all of the yards, rope-making, sail-making, anchor-forging, block-making, and other manufacturing operations connected with the finishing and furnishing of ships. There are also arrangements connected with the storing of guns and other munitions of war. The yards at Plymouth, Gosport, and Deptford are limited to large establishments for victualing the navy; while, of the dock-yards proper, some have appliances for supplying seamen's clothing and necessaries; some for repairing steam-machinery for war steamers; one (at Chatham) for making most of the articles in copper and brass required by the navy. To enable our ships to be repaired and refitted abroad, there are royal dock-yards at Gibraltar, Malta, Halifax, Bermuda, Jamaica, the cape of Good Hope, Ascension, Trincomalee, and Hong-Kong. Since the creation of a steam-navy, and the large substitution of iron for wood in ship-building, an increasing proportion of the royal ships are built in private yards. All the dock-yards are under the admiralty, and each is governed by a distinct set of officers responsible only to that department. The chief officer, called the superintendent, is generally an admiral, but sometimes only a captain; and the office is deemed an honorable recognition of past services. The superintendent controls all the other officers, and all the artificers and laborers employed; examines the accounts, authorizes the payments, and is responsible for the stores. When a new ship is to be built, or other work executed, the superintendent receives general instructions from the admiralty, while special instructions are conveyed to other officers more immediately connected with the actual working. In yards were steam-machinery is repaired and fitted, engineers form an important part of the establishment. The artisans of the dock-yards comprise shipwrights, calkers, joiners, smiths, millwrights, block-makers, sail-makers, rope-makers, etc.; while under these is a large body of laborers.

In 1876–77, £1,323,750 was voted for the dock-yards at home and abroad, including £1,072,334 for wages of workmen and artisans. These charges are exclusive of all materials, and are for the dock-yards only, as distinguished from the victualing yard. The sum of £1,261,320 was voted for stores and materials for building and fitting out vessels for the fleet. Severe strictures have been made from time to time upon the management of our dock-yards. Several committees and commissions have been appointed to investigate the causes of defects, and to suggest remedies; and the reports issued on the subject have been from time to time laid before parliament.

DOCTOR (Lat. *docēre*, to teach), a teacher. Originally, the word doctor was used, in accordance with its etymological derivation, to signify a teacher in general, and it was not till the 12th c. that it became a title of honor for the learned, irrespective of the function of communicating knowledge. It had frequently appended to it, in those early days, some additional expression intended to characterize the peculiar gift of its possessor. Thus, Thomas Aquinas was called the Doctor Angelicus; Bonaventura, the Doctor Seraphicus; Alexander de Hales, the Doctor Irrefragabilis; Duns Scotus, the Doctor Subtilis; Roger Bacon, the Doctor Mirabilis; William Occam, the Doctor Singularis; Gregory of Rimini, the Doctor Authenticus; Joseph Gerson, the Doctor Christianissimus; Thomas Bradwardine, the Doctor Profundus; and the like. The word had long been used, even in the universities, as a general expression for a teacher before it came to designate a degree or rank in the learned hierarchy to which only the united body of the teachers could advance or promote the candidate. These formal promotions commenced at Bologna in the 12th c., and the learned Irnerius, the regenerator of the Roman law at that period, is said to have introduced the ceremonial which was afterwards universally adopted. Irnerius, however, is a sort of mythical hero in university history, and such statements with regard to him must be received with caution. See PROMOTION. The university of Paris almost immediately followed in the footsteps of Bologna, the first reception of doctors having taken place in the year 1145, in favor of Peter Lombard and Gilbert de la Porrée, the greatest theologians of the day. Subsequently to this period, the emperors were in use expressly to confer upon the universities the right of appointing doctors of laws by their authority and in their name. The example of the emperors was speedily followed by the popes, who conferred corresponding rights with reference to the canon law. From the 11th to the 13th c., there seems reason to believe that, both in Italy and France, the terms master and doctor were pretty nearly synonymous. In the German universities, the professors of theology were more commonly known as masters; and in the beginning of the 15th c., in accordance with the practice of the university of Prague, the distinction was pretty consistently made between doctors of law and medicine, and masters of theology and philosophy In modern times, the title of doctor has been applied almost everywhere to the three faculties of theology, law, and medicine. In Germany, it extends to that of philosophy, in which, in this country, the older title of master is still retained. The doctor's degree is, in general, conferred at the instance of the dean of the faculty to which it appertains. It is granted either on examination, and after the ancient form, at least, of publicly

defending a learned thesis in Latin has been observed, or else it is an honorary degree, conferred in consideration of the general reputation of the recipient for eminence in some particular branch of learning, philosophy, or science. See DEGREE. In Germany, the doctor ranks before the untitled nobility and next to the knight; and amongst themselves, doctors take the rank of the faculties to which they respectively belong, the first being theology, the second law, and the third medicine. In Oxford and Cambridge, and recently also in the German universities, doctors of music have been created. In the latter country, also, learned ladies have occasionally shared the honors of the doctorate. Dorothea Schlözer received the degree of doctor of philosophy from the university of Göttingen in 1787; Mariane Charlotte von Sieb[o]ld, that of medicine from Giessen in 1817; and Johanna Wittenbach, in philosophy, from Marburg in 1827. Of the four ancient degrees of bachelor (q.v.), master of arts (q.v.), licentiate (q.v.), and doctor, the modern university of France has retained only those of bachelor, licentiate, and doctor. Up to the period of the revolution, the highest consideration attached to the title of doctor of the sorbonne (q.v.)—that famous theological faculty, which was called "the perpetual council of the Gallican church," and of which the present faculty of theology of the academy of Paris is but a feeble and lifeless reproduction. But though the degrees of the sorbonne continued to enjoy, and apparently to merit, some degree of respect, such was by no means the case with those of the other schools of learning in France. Furettière, in his dictionary, defines a bachelor as a man who learns, and a doctor as a man who forgets. The ridicule of Voltaire, La Fontaine, Le Sage with his Doctor Sangrado, and Molière in the *Malade Imaginaire*, will readily occur to our readers as illustrating the position which was then held very generally by French doctors.

In England, the doctor's degree was not introduced into the universities till the reign of John or of Henry III. At first it was a very rare and highly prized honor, and the ceremony of conferring it was attended by scenes of feasting and revelry, of which curious accounts will be found in Antony à Wood's *History and Antiquities of the University of Oxford*. Colored engravings of the dresses worn by doctors of the several faculties at Oxford and Cambridge are given in Ackermann's histories of these universities. As to professional uses of the degree of doctor of civil law, see DOCTORS COMMONS.

DOCTORS COMMONS, formerly the college of the doctors of civil law in London, wherein the court of admiralty and the principal ecclesiastical courts were held. It was founded by Dr. Henry Harvey, dean of the arches, previous to which time the doctors had lived in Paternoster row. The original building was burned in the great fire in 1666, when the doctors removed for a time to Exeter house. After some time the commons was rebuilt, and the doctors returned to their former quarters. The courts which had been wont to hold their sittings at doctors commons are—the court of arches, the archdeacon's court, the prerogative court, the faculty court, the court of delegates, and the court of admiralty. The prerogative court is now amalgamated in the probate court (q.v.), and the court of delegates (q.v.) is transferred to the judicial committee of the privy council. At the time when these courts were all in full operation, their times of session were regulated by terms, as in the courts of equity and common law, a certain day in the week being assigned to each court for hearing its causes. The court of arches, the archdeacon's court, the faculty court, and the court of admiralty, have been changed, and no longer continue to exercise their functions in this once famous spot. The court of arches (so called from having sat in *Arcubus*, or under the arches or bows of Bow church, Cheapside) is the court of appeal belonging to the archbishop of Canterbury. The judge in this court is styled dean of the arches, and he has jurisdiction, as the archbishop's principal official, in all ecclesiastical causes within the province of Canterbury. He has original jurisdiction, also, in certain causes by *letters of request* (q.v.). It was by virtue of letters of request that matrimonial causes were tried in the court of arches; but this branch of its jurisdiction is now removed to the divorce court (q.v.). The archdeacon's court is an inferior court for the consideration of ecclesiastical questions occurring within the archdeaconry. For an account of the other courts mentioned in this article, see the several heads to which they refer. The practitioners in the several courts to which we have alluded were the doctors of civil law, called in the ecclesiastical courts advocates and proctors, who performed similar duties to those of attorneys or solicitors in the courts of law and equity. Both classes of practitioners required, in order to their admission to practice, to obtain the fiat of the archbishop, and afterwards to be duly admitted by the dean of the arches. The form of admission was in both cases attended with much ceremony. The doctor elect was introduced to the presiding judge by two doctors habited in their scarlet robes. The candidate then made a short Latin speech, and was admitted to practice in the courts. The habit of the doctors is a scarlet robe with a hood, trimmed with taffeta or white minever. The proctors were, in like manner, introduced by two senior proctors. In 1857, power was given by 20 and 21 Vict. c. 77, to dissolve the college of doctors commons and sell the property. The proctors received compensation, and all solicitors are allowed to act as proctors, and all proctors were turned into solicitors, all being alike solicitors of the supreme court, 21 and 22 Vict. cc. 95, 108; 23 and 24 Vict. c. 27; 33 and 34 Vict. c. 28, s. 30; 40 and 41 Vict. c. 25, s. 17. Nevertheless the old names continue, and will no doubt

only by degrees cease to be used in reference to ecclesiastical courts and proceedings. For a full account of doctors commons, see Stowe's *London*.

DOCTRINAIRE (a French term derived from doctrine) signifies, properly, the scientific taking up and exposition of a subject, as opposed to a treatment which is merely external, and which rests on accidental characteristics. In general, however, it is used as a term of reproach, to characterize views which are pedantic, schoolmasterly, and unpractical. In this sense it was applied in France, during the restoration, by the reactionary court-party to the fraction of the parliamentary opposition, who supported scientific doctrines of constitutional liberty against the arbitrary will of the monarch. This party, which had its rallying-point in the salons of the duc de Broglie, was led in the chamber by Royer Collard, and supported in the press and before the public by Guizot, and the younger members of what afterwards became the Orleans party. The development of the constitution on the basis of the *charte* of Louis XVIII., was the watchword of those men; but their real inspiration was derived from England. When the revolution of 1830 occurred, they became the advisers and ministers of the king of the French, and were more deeply imbued with the principles of constitutional monarchy than any other political party that has ever existed in France. The true fathers of the *doctrinaires* were Mounier, Lally Tollendal, Clermont Tonnerre, Talleyrand, and the abbé Montesquiou; and the cradle of the party was the original *comité* of the constitution, which, about twenty-five years before, elaborated the *charte* of 1814. Its later representatives found a center in the court of the exiled queen Marie Amalie at Claremont, and a vigorous supporter in her gifted son, the duc d'Aumale.

DOCTRINE. See DOGMA.

DOD, ALBERT BALDWIN, D.D.; 1805–45; son of Daniel; a graduate of Princeton, and tutor in the college 1827–29, and in 1830, chosen professor of mathematics. He lectured upon political economy and architecture, and wrote for the reviews and magazines of the period.

DOD, DANIEL, 1788–1823; b. Va., educated at Rutgers college, and especially devoted to the construction of steam machinery. He began when steam navigation was in its infancy, and soon became one of the most successful engine-builders in the country. He met his death in consequence of an explosion of a boiler on a steamboat in which he was experimenting on the East river, New York.

DODD, The Rev. WILLIAM, LL.D., was b. in 1729 at Bourne, in Lincolnshire; was educated, in the first place at a private school; and was admitted in 1745, as a sizar to Clare college, Cambridge, where after five years of study, he took his degree of B.A. Shortly after, he removed to London, received orders from the bishop of that city, and soon after gained a reputation as a popular preacher and as a successful littérateur. Through his celebrity as a divine and man of letters, and by means of flattering the great, he succeeded well in London, and in 1763 was appointed tutor to Philip Stanhope, the fifth earl of Chesterfield. His habits, however, were very expensive, and an income of £800 per annum, even when augmented by the produce of his literary labors, was not sufficient to supply his wants. This extravagance proved his ruin, as it tempted him to forge the signature of his former pupil, the earl of Chesterfield, to a bond for £4,200. For this crime he was arrested in Feb., 1777, and though he refunded the money, he was tried, convicted, and executed on the 27th of July. His writings are numerous and varied. His *Beauties of Shakespeare* (2 vols., Lond. 1753) is well known, as are also his *Reflections on Death* (1763), and *Thoughts on Death*, a poem composed during the time that intervened between his conviction and execution.

DODDER, *Cuscuta*, a genus of plants referred by some botanists to the natural order *convolvulaceæ*, and regarded by others as the type of a small distinct natural order *cuscutaceæ;* which differs from *convolvulaceæ* in the habit of the plants, leafless climbing parasites, with flowers in dense clusters; in having scales on the tube of the corolla alternate with its segments; and in having a spiral thread-like embryo, lying in a mass of fleshy albumen, whilst the cotyledons are so small that the embryo has been described as destitute of them. There are about 50 known species of *cuscutaceæ*, chiefly found in the warmer temperate parts of the globe. The name D. is often extended to all of them. One or two species of *cuscuta* are natives of Britain, parasitic on leguminous plants, heath, thyme, hops, nettles, etc. A species of D. is very injurious to crops of flax in Germany, and leguminous crops often suffer from this cause in the s. of Europe. The seed of D. germinates in the ground, but the stem soon seeks to attach itself to plants by little rootlets which it sends out, and the original root dies. The appearance of D. has been described as resembling "fine, closely tangled, wet catgut."

DODDER-LAURELS, *Cassythaceæ*, parasitic plants appearing generally like dodders, but in many respects resembling laurels. They grow only in hot regions, where they supplant the dodders. Only a single species is known in the United States.

DODDRIDGE, a co. in n.w. West Virginia, crossed by a division of the Baltimore and Ohio railroad; 300 sq.m.; pop. '70, 7,076—35 colored. The surface is hilly; chief business, agriculture. Co. seat, West Union.

in which trade he was very successful. In 1737, his *King and the Miller of Mansfield* was brought out at Drury Lane, and met with an enthusiastic reception. This was followed by *Sir John Cockle at Court; The Blind Beggar of Bethnal Green;* and *Rex et Pontifex*, which were republished in a collected edition of his dramatic works with the title of *Trifles* (1748). Meantime, he was conducting his business with such ability and spirit, that in the course of three years after commencement he was in a position to buy copyrights. In 1738, he bought Johnson's *London*, giving for it no more than ten guineas. His most successful work was a tragedy called *Cleone*, which was acted at Covent Garden with extraordinary success. On its publication, 2,000 copies were sold the first day, and within the year the work ran through four editions. With *Cleone* he closed his career of dramatic authorship. D. was connected either as contributor or publisher, and occasionally as both, with several magazines. He is, however, chiefly remembered now on account of his *Select Collection of Old Plays* (12 vols. 8vo, 1780); and his *Collection of Poems by several Hands* (4 vols. 12mo, 1748). Besides the volume entitled *Trifles*, another volume of his collected works was published in 1772 under the title of *Miscellanies*. He died in 1764.—See Knight's *Shadows of the Old Booksellers* (1865).

DODWELL, EDWARD, 1767–1832; an English antiquarian writer and draughtsman. From 1801 to 1806 he traveled in Greece, and spent the rest of his life for the most part in Naples and Rome. He wrote *A Classical and Topographical Tour through Greece*, and *Views and Descriptions of Cyclopean and Pelasgic Remains in Italy and Greece*, the last profusely illustrated. His widow, who was 30 years his junior, became the countess of Spaur, and was conspicuous, not only for beauty, but in the political life of Rome.

DODWELL, HENRY, 1641–1711; a native of Dublin, educated at a free school, and by the death of his parents reduced to great poverty. He became a fellow of Trinity college, and in 1688 was elected Camden professor of history at Oxford; but in 1691, he was deprived of his professorship for refusing to take the oath of allegiance to William and Mary. The remainder of his life was devoted to literary labors in chronology and ecclesiastical polity, and resulted in a number of valuable works. In religion, he was extreme, at one time promulgating the notion that immortality could be enjoyed only by those who had received baptism at the hands of one set of regularly ordained clergy, and was therefore a privilege from which dissenters were hopelessly excluded; again arguing from Scripture and the early fathers that the soul of man is naturally mortal, and gains continuance by only the special act of God. His son HENRY was the author of *Christianity not founded on Argument*, to which WILLIAM, another son, published a reply.

DOE, JOHN, the fictitious plaintiff in ejectment, whose services are dispensed with since the abolition of the fiction.—Wharton's *Law Lexicon*.

DOESBORGH (*Drususburgi*), a t. in the Netherlands, province of Gelderland, lies 11 m. e.n.e. from Arnhem, on the right bank of the Yssel. It was formerly fortified, but the walls have been broken down, planted with trees, and formed into pleasant promenades. An intrenched camp has been constructed on the n.e. side, between the Yssel and Old Yssel, which here unite. The streets are broad, and many of the houses handsome. There are several benevolent institutions, a grammar-school, boarding-school for boys and girls, and good public schools. The trade is considerable. Ship-building, book-printing, the making of eau de Cologne, preparing mustard, etc., are carried on. Pop. '77, 4,517.

DOFFER is that part of a carding-machine which takes the cotton from the cylinder when carded. See CARDING.

DOG, *Canis*, a genus of digitigrade (q.v.) carnivorous (q.v.) quadrupeds, which, as defined by Linnæus, included all that now form the family *canidæ* (q.v.), and also hyenas. In the genus as now restricted, wolves and jackals are generally included by naturalists, along with those animals to which alone the name dog is popularly applied, and a distinctive character of principal importance is found in the pupil of the eye, which is always round—contracting circularly, whilst in foxes it assumes the form of a section of a lens when contracted. The present article is limited to dogs in the common acceptation of the term, wolves and jackals being the subjects of separate articles; and only remarks relative to dogs in general will here find a place, many of the particular kinds being sufficiently important to be separately noticed.

At the very outset we encounter one of the most perplexing and difficult questions in natural history, as to the number of *species* of dog, and the origin of the domestic dog; two questions in appearance, but rather one in reality, and one on which the opinions of the most eminent naturalists are very much divided. According to some, all domestic dogs are to be regarded as of one species; and as in the case of some other valuable domestic animals, that species is not certainly known to exist in a truly wild state, all the wild dogs which must be admitted to belong to the same species being viewed as the offspring of domestic dogs which have returned to a wild state, and in which, however, it is supposed that the original type or characteristics of the species, modified by domestication, have in a great measure reappeared. According to others, there are numerous species of dog, originally distinct, which have been domesticated

by the inhabitants of different countries, but which, however, are very nearly related not only in their physical characters but in their dispositions and in some of their principal instincts, and which were capable of intermixing, not perhaps indiscriminately, but within certain limits, and so as to produce new races. By some who hold the first of these opinions, it is further maintained that the wolf and the dog are one species, and that all domestic dogs are derived from the wolf; whilst others advocate the claims of the jackal to be regarded as their original parent and type. By some of those who hold the species to be numerous, it is supposed not improbable that the blood of wolves and of jackals may be mixed in some of the domestic races with that of the original dogs. It is impossible for us to do more than state these different views, and a few of the principal arguments by which they are supported.

It is admitted on all hands, that there is great diversity among the different kinds of domestic dogs, many distinct races having long existed, which differ not only in size and other physical characters, but to a notable extent also in dispositions and instincts; it is further admitted that there appear to be no definite limits to the possible intermixture of these races with each other. So great is the diversity of physical characters, that naturalists of the greatest eminence almost acknowledge themselves incapable of pointing out any that are common to all dogs, and yet distinguish them all from the different species of wolves and jackals; and in fact, the *recurved tail*, not apparently a character of the first importance, is named by Cuvier himself as the most certain and unvarying specific distinction. The obliquity of the eyes of wolves is also contrasted with the more forward direction of those of dogs, which is accounted for—in favor of the theory of wolfish origin—by the supposition that it results from "the constant habit, for many successive generations, of looking forwards to their master, and obeying his voice."—Bell's *British Quadrupeds*. This, on the other side, is treated with ridicule; it is certainly a transition from the region of observation and ascertained fact to that of mere theory and conjecture. In size, dogs differ so widely that one is not as large as the head of another; the difference in form of body, head, or limbs, is almost equally great between the Newfoundland dog or the mastiff and the greyhound. The gradations, however, from one form or character to another, render it impossible to draw a fixed limit. In some races of dog, the hind-feet as well as the forefeet have five toes, instead of four, which is more common; but this has not been much insisted on as a ground of specific distinction. Greater value ought perhaps to be attached to the want in some, as the dholes (q.v.) of India, of the second tubercular tooth in the lower jaw; the hairiness of the soles of the feet of some is perhaps also not unimportant; and in favor of the opinion that domestic dogs have originated from an intermixture of several species, it has been urged that the number of teats in the female varies, and that there is sometimes even a difference between the number on one side and on the other, which has never been observed to be the case in wild dogs, and in them the number in the same kind is always uniform. Some of these points, however, have not received the investigation necessary to a confident determination of the measure of importance which ought to be assigned to them.

It seems to have been too hastily taken for granted, in favor of the opinion that there is only one species of dog, that all the wild races, even the dholes and the dingo, have sprung from domestic progenitors. There is certainly no evidence of this; and the fact that wild races exist, exhibiting marked diversities of character, in countries widely remote and of very different climates, is referred to with confidence on the other side, as affording at least a strong presumption in favor of the supposition that man has, in different countries, domesticated the species which he found there. We do not yet know enough of the amount and limits of the changes which circumstances and climate may produce, to warrant any confident conclusions on that ground. And if we were to adopt the views of those who ascribe least to such causes, we might yet demand them to show why, although from certain original types no mixed race can originate, there may not yet be other original types capable of such combination, or why the limits must be held equally impassable between all that were framed by an original act of creation. That there was only one original pair of the human race, may be held, without our of necessity holding that there was only one original pair of dogs. But to this consideration due place has, perhaps, scarcely been given.

That the common fox—or any species of fox—is a parent of any race of dogs, is not the opinion of any naturalist. Some dogs have a somewhat fox-like appearance, and indeed it is now generally admitted that the dog and fox will breed together, but as it has not been proved that the individuals of the cross will breed together, this fact does not warrant the assertion that the dog and fox belong to the same species. Instances of commixture between the dog and wolf have occurred in greater numbers, and without the compulsion of confinement, but in this case, too, the only recognized proof of identity of species—namely, the permanent fertility of the progeny—is wanting.

In favor of the specific identity of the dog and wolf, one of the strongest arguments is drawn from the equality of the period of gestation—63 days. But it may be remarked that an inequality of the period would have afforded a much stronger argument on the other side.

Against the identity of the dog and wolf, the difference of disposition has been strongly urged. In reply, it is shown by well-authenticated instances that the wolf is

very capable of that attachment to man which so remarkably characterizes the dog. There is greater value, perhaps, in the argument of col. Hamilton Smith, that "if domestic dogs were merely wolves modified by the influence of man's wants, surely the curs of Mohammedan states, refused domestic care, and only tolerated in Asiatic cities in the capacity of scavengers, would long since have resumed some of the characters of the wolf."

Buffon's notion, that the shepherd dog is the original type of the whole species, from which all dogs are derived, is merely fanciful, and his endeavor to support it by a comparative view of the different kinds, only exhibits a certain amount of ingenuity.

The shepherd's dog is one of the kinds of dog having greatest development of brain, but it is still greater in the spaniel. The skulls of dogs, however, neither exhibit very marked distinctions when compared with each other, nor when compared with those of wolves and jackals.

It is universally believed that the diversity of color exhibited by many dogs is a result of domestication, as it is neither found in those which may be supposed to exist in a state of original wildness, nor in those wild races which are certainly known to be the progeny of domestic dogs, a return to uniformity of coloring being apparently one of the most speedy consequences of a return to wildness. Black, reddish-brown, and white, the uniform colors observed in wild dogs, are, however, the colors which chiefly appear mixed in domestic races.

Pendulous ears are generally regarded as another result of domestication in dogs, as in rabbits; and it is certain that the wild races known have erect and pointed ears; but no wild race has been discovered at all corresponding to the mastiff in some of its other most notable characters, particularly the shortness of the muzzle, and depth of the chops, and it has therefore been conjectured that this and kindred races may have derived their origin from some wild dog of the interior of Asia, which has not yet come under the notice of any scientific observer.

The dog has been a domestic animal from a very early period. The earliest allusions to it are in the books of Moses, but they indeed correspond with the dislike and contempt still commonly entertained for it by many of the nations of southern Asia. By Homer, however, it is very differently mentioned; and "there is not a modern story of the kind which can surpass the affecting simplicity with which the poor dog's dying recognition of his long-lost master is related by one who wrote, probably, not less than 2,700 years ago." The sculptures of Nineveh, and the hieroglyphics of Egypt, attest the very early domestication of the dog, and the existence of races similar to some of those which exist at the present day; and the high value attached to it by many nations is further attested by the place assigned to it, or its image, as emblematic of the attributes which they ascribed to their gods. We do not now set so high a value on the dog, in consideration of mere usefulness to man, as on some of the other domestic animals; yet to the savage it is perhaps the most important of all, and some have supposed that by its aid the subjugation of other animals may have been first accomplished. Cuvier makes the strong assertion, that the dog "is the most complete, the most singular, and the most useful conquest ever made by man." The dog, far more than any other animal, becomes a humble friend and companion of man, often seeming actually to know and sympathize with the joys and sorrows of his master; and on this account it is, that he is alike "the pampered minion of royalty, and the half-starved partaker of the beggar's crust."

The uses to which the dog is applied are numerous, and correspond, in some measure, not only with distinct physical characters, but with remarkably distinct instincts of different breeds. Thus, whilst in some countries dogs are chiefly employed as beasts of draught, particularly for drawing sledges in the frozen regions of the north, and in other countries chiefly for the chase, the exquisite scent of some kinds, and the remarkable fleetness of others, variously recommending them for this use, we find them also rendering important services in the care of sheep and other cattle, and endowed with hereditary instincts wonderfully fitted for this purpose, and we find them, with like adaptation of instinct, highly valuable in watching and protecting the abodes and properties of their masters. Not the least interesting of the employments to which the dog has been devoted by man, is that of leading about the blind, which is often done with an intelligent and affectionate solicitude highly worthy of admiration.

Anecdotes illustrating not only the instincts, but the intelligence and affection of dogs, are familiar to every one, and form one of the most pleasing parts of many a book of natural history. Attractive to children, they are worthy of all the consideration which they can receive from the most philosophic mind. Volumes have been filled, and more volumes might easily be filled, with anecdotes well authenticated, and well worthy of preservation.

The dog produces usually from six to ten young ones at a birth. They are born blind, open their eyes about the tenth or twelfth day, attain their full growth in about two years, seldom live more than twelve or fifteen years, and almost never more than twenty.

No satisfactory classification of the different kinds of dog has ever been made. What some naturalists regard as types of species, others pronounce to be mere mongrel races. Nor can any principle of arrangement be found in form, roughness or smooth-

ness of fur, or other such character, which will not associate kinds that are in other respects widely dissimilar, and separate some that are nearly allied.

Col. Hamilton Smith arranges domestic dogs in six groups or sections: 1. "The wolf dogs," including the Siberian dog, Esquimaux dog, Iceland dog, Newfoundland dog, Nootka dog, sheep dog, great wolf dog, great St. Bernard dog, Pomeranian dog, etc. 2. "The watch and cattle dogs," including the German boar-hound, Danish dog, matin, dog of the North American Indians, etc. 3. "The greyhounds," including the Brinjaree dog, different kinds of greyhound, Irish hound, lurcher, Egyptian street dog, etc. 4. "The hounds," including the bloodhound, old southern hound, staghound, foxhound, harrier, beagle, pointer, setter, spaniel, springer, cocker, Blenheim dog, water dog or poodle, etc. 5. "The cur dogs," including the terrier and its allies. 6. "The mastiffs," including different kinds of mastiff, the bull dog, pug dog, etc. Col. H. Smith does not include in any of these groups the dholes, dingo, etc., which he even separates from the genus *canis*.—Mr. Richardson arranges dogs in three great groups, "indicated by the least variable part of their osteological structure, cranial development." 1. Including the Irish wolf dog, highland deerhound, all kinds of greyhounds, and the tiger hound, characterized by *convergent* parietal bones, an elongated muzzle, and high and slender form. 2. Including the great Dane, the French matin, the pariah of India, the bloodhound, staghound, foxhound, harrier, beagle, pointers, terriers, turnspit, Newfoundland dog, Labrador dog, Pomeranian dog, Esquimaux dog, Siberian dog, Iceland dog, shepherd's dog, etc., characterized by *parallel* parietal bones, and generally by much acuteness of smell. 3. Including mastiffs, the great St. Bernard dog, bull dog, pug dog, etc., characterized by sensibly *divergent* parietal bones, bulk of body, robust structure, and combative propensities.

DOG (in law). The keeping of vicious or destructive dogs, or other animals, except under proper precautions, is illegal; and the proprietor is liable for the damage which they occasion in all cases in which it cannot be clearly shown that the fault lay with the party injured. Even before the injury occurs, it is competent to enforce measures of precaution. If a man have a dog which he knows to be of a savage nature, and addicted to bite, and he allow it to go in a frequented place without being muzzled or otherwise guarded so as to prevent it from committing injury, he may be indicted in England as for a common nuisance. If the dog be of a ferocious kind, as a mastiff, it has been held that he must be muzzled (1 Russ. 303); and it will be no defense in an action of damages against the master, that the person injured trod on the dog's toes, for he would not have trodden on them if they had not been there (3 Car. and P. 138). The harboring of a dog about one's premises, or allowing him to resort there, will warrant indictment (M'Hone and Wood, 5 C. and P. 2). If a dog known to his proprietor to have previously bitten a sheep, be retained by him, the proprietor will be liable to all subsequent injuries even to other animals, as, e.g., a *horse*. (Burn's *Justice of the Peace*, vol. ii. p. 333). In Scotland, a warrant may be obtained, on proof of vicious practices and danger to the public, either from the sheriff or the justices, on a summary complaint, to have a dog secured or slain, and the owner found liable in expenses. The complaint may be at the instance either of the fiscal or of a private party, with or without the fiscal's concurrence. An interdict may be granted against the D. going loose pending the discussion of the question as to whether or not he ought to be killed. Many local police acts contain provisions as to shutting up or muzzling dogs during the prevalence of weather likely to produce hydrophobia; and where such do not exist, the subject may be dealt with by the magistrate at common law. Formerly, the common law of England held that it was not larceny to steal any of the baser animals, in which class all dogs, except those of value, were included. But by 7 and 8 Geo. IV. c. 29, dog-stealing was declared to be an offense punishable by fine. This act was repealed, and new regulations of a more stringent kind made by 8 and 9 Vict. c. 47. By that enactment dog-stealing is a misdemeanor, punishable, on summary conviction, for the first offense, by six months' imprisonment and hard labor, or fine not exceeding £20 beyond the value of the dog. The second offense is an indictable one, punishable by fine or imprisonment and hard labor not exceeding eighteen months, or both. Similar punishment is provided for persons found in possession of dogs or dogs-skins, knowing them to have been stolen. A D. going into a neighbor's field does not afford ground for an action of trespass unless he does mischief; and even then the person who kills him in certain circumstances, may be liable in damages (3 Marsh. 584). The use of dogs for purposes of draught was prohibited under a penalty by 2 and 3 Vict. c. 47, which is explained by 17 and 18 Vict. c. 60, s. 2. See ANIMALS, CRUELTY TO.

Tax on Dogs.—The duty charged on every D. above the age of six months is 5*s.*, and shepherds' dogs are not exempt. Until recently, the duty on every D. was 12*s.* The maximum charge for any number of hounds was £39 12*s.*; of greyhounds, £9. Any D. kept wholly for the care of sheep or cattle, if not a greyhound, hound, pointer, setting-dog, spaniel, lurcher, or terrier, was exempt.

DOG'BANE, *Apocynum*, a genus of plants of the natural order *apocynaceæ*, having bell-shaped flowers, no style, and the fruit a long linear follicle. Some of the species are shrubby, some herbaceous; some extend into colder climates than is usual for plants of this order. The D. of North America (*A. androsæmifolium*), a perennial herbaceous

plant, about 4 ft. high, with smooth stem, much milky juice, smooth ovate leaves, and whitish rose-colored flowers, growing in open barren places from Georgia to Canada, is valued for the medicinal properties of the bark of its root, which is emetic, diaphoretic, and in small doses tonic. The root of CANADIAN HEMP (*A. cannabinum*), a plant noticed on another account in the article *Apocynaceæ*, possesses similar properties, and is frequently used in the United States.

DOG-DAYS. See CANICULAR DAYS.

DOG DISTEMPER, a kind of violent catarrh, common among dogs, especially when young, producing running at the eyes and nose, and a dry cough, followed by wasting of flesh and loss of strength, and sometimes by inflammation of the lungs and dysentery. The usual remedies are laxatives, emetics, and occasional bleeding. Astringents are useful in diarrhea, and fits may be modified by anodynes and warm baths.

DOG-DRAW. An apparent deprehension of an offender against venison in the forest. Dog-draw is where any man hath stricken or wounded a wild beast by shooting with a cross-bow, long-bow, or otherwise, and is found with a hound or other dog drawing after him to receive the same.—Cowel's *Interpreter*.

DOGE (equivalent to *duke*) was the name of the chief magistrate, possessing princely rank, in the republics of Venice and Genoa. Dogate or dogado, both from the Latin *ducatus*, duchy, is used to indicate the dignity of doge. We find doges of Venice elected by the people, but enjoying almost the rights of absolute monarchs, as early as the beginning of the 8th century. Their power, however was considerably reduced towards the end of the 12th c., through the creation of a great council, composed of 470 members, chosen from nobles as well as citizens, and invested with legislative power. These afterwards appointed six of their own number to superintend the D. in the exercise of his executive power. Further, the *pregadi*, or nobles, who formerly were admitted by the D. to a share in the public affairs, were organized into a regular board of administration, numbering 60 members. By the new constitution, the people, too, lost the most essential of their rights—viz., the right of electing the doge. This right was now changed into a privilege belonging exclusively to the great council, whose members elected 24 from among themselves, and these latter again elected, by ballot, 12 of their own number, upon whom devolved the right of appointing a doge. Sebastiano Ziani was the first D. thus elected, 1177; and on the occasion of his elevation to office, he scattered money among the people, to console them for the loss of their rights—an act which was imitated by his successors, and soon became a recognized custom, as was also the case regarding the manner in which he went through the ceremony of wedding the Adriatic sea. The pope Alexander III., whom, during his quarrels with the emperor Frederic I., the D. had faithfully supported, sent him, together with other privileges, a ring, as the symbol of domination the republic had acquired over the Adriatic. Accordingly, a marriage ceremony took place on Ascension day—a ring being thrown from the ship *Bucentaur* into the sea, to show that as the wife is subject to her husband, so is the Adriatic sea to the republic of Venice. The practical bearing of the ceremony soon appeared in the shape of stringent measures, regulating the navigation of the Adriatic, and imposing tribute upon all foreign ships. The power of the D. underwent, in 1179, a signal modification; the Treble Quarantia—a high court of justice, composed originally of 40 members—having been erected, as also the board of *advogadori*, for the settlement of fiscal questions instituted. During the reign of Jacopo Tiepolo, 1229–49, a new restriction arose from the creation of an independent police, and a still greater one from the formation of a tribunal consisting of three inquisitors and five correctors, who, on the demise of a D., had to examine his conduct, sifting the minutest particulars of his private life. All these changes were effected by the great council, to the thorough exclusion of the people. In 1268, the great council, in order to cut short all family influence upon the affairs of the state, devised a curious and extremely complicated mode of election; but notwithstanding the limitations new and old, the power of a D. continued great, if he was only wise enough to profit by the contentions between nobles and citizens, the disputes of the different authorities, and especially by his own position as commander-in-chief of the forces and high-admiral of the navy. This last prerogative of the D. remained in vigor up to 1628, when, by a formal enactment, the D. was prohibited the exercise of such command, unless he were authorized by the council of forty. Other privileges, however, belonging originally to the dogate, were abrogated or circumscribed long before this, and especially during the period 1289–1311. Thus, at the instigation of the D., Gradenigo, who was actuated by jealousy towards the mighty family Tiepolo, the famous law of "closing the great council" was passed, and by it the whole legislative and judicial power made the heirloom of those families whose names were inscribed in the Golden Book, or *Libro d'Oro*. About that time (1309), ecclesiastics of any degree were declared unfit for political or judicial functions. To counterbalance the influence of discontented nobles, a public feast was instituted—to come off yearly—at which the D. gave a dinner to the fishermen, fraternizing with them in testimony of equality. Shortly before Gradenigo's death, that terrible tribunal, the council of the ten, was erected, which was to be the highest in the state, irresponsible, and entitled to pass judgment upon the D. himself. In the meanwhile, the great council managed to get the functions,

public as well as private, of the D. circumscribed in the minutest way. It was ordered that the D. should not announce his accession, except to the princes of Italy; neither was he permitted the opening of dispatches emanating from the popes or from princes; the kissing of his hands, or kneeling down in his presence, was strictly interdicted. He could not leave town, be possessed of real property abroad, or allow his children to contract matrimonial connections with foreign houses, accept donations, etc. He had to submit to the continued presence of two *advogadori*, to be fined for the least mistake, and bear the expenses of the ducal dignity from his own purse. To all these restrictions and burdens the D. declared himself liable on the occasion of his coronation, by signing a document headed "Promissione." The state costume and retinue of the D. were minutely defined, and a trifle fixed as his salary. As a symbol of princely dignity, the D. wore a horned cap, and had the title of serenity. The credentials of ambassadors were written in his name, but signed by a secretary of state, and sealed with the arms of the republic. The money was struck in his name, but not with his stamp or arms. All the magistrates rose and saluted the D. when he came into council, and the D. rose to none but to foreign ambassadors. His family was exempt from the jurisdiction of the master of the ceremonies; and his children, though excluded from public offices, were allowed to have staff-officers, and gondoliers in livery. After the death of And. Dandolo, 1354, on a motion from the correctors, the three presidents of the quarantia, and later six ministers, were joined to the six privy-councilors of the D., who, together with the above-named, has formed henceforward the so-called Signoria Serenissima. At that stage the rank of D. could no longer be an object of ambition, and as early as 1339, a law was necessary to prohibit the D. elected from resigning his place. And. Contarini, 1367, accepted the proffered dignity only upon the threat of being declared a traitor to the country. In 1413, by a law emanating from the great council, the D. was even denied the title of Signoria, that of Messere being substituted instead; at the same time he was deprived of the right of convening an *arengo*, or meeting of the people. With the fall of the Venetian republic, 1797, the dignity of D. also disappeared. There were in all 73 D. at Venice, the first of whom, Anafeste (Paoluccio) was elected 697; the last, Manin (Lodovico), 1788. In the Palazzo Ducale, the celebrated frieze of the D. is to be seen round the Sala del Maggior Consiglie, exhibiting 72 portraits, and one space covered with a black veil, with an inscription, indicating that Faliero (Marino) was beheaded for high treason.

The republic of Genoa elected, after a victory gained by the party of the people (1339), Simon Boccanera for its first doge. He was elected for life, and with absolute power, of which, however, he allowed a share to 12 aldermen (*anziani*), the one half being chosen from the *cittadini* (citizens), the other among the *nobili* (nobles). In the long run of centuries, the power, duration, and splendor of the ducal seat underwent frequent changes, arising from the vicissitudes of the state and the hostilities between the popular and aristocratic parties. A constitution for defining the functions and prerogatives of the D. was framed in 1528, after the great victory of And. Doria over the French. According to this constitution, which, with slight modifications, remained till the end of the republic, the dignity of D. was of two years' duration, under restrictions similar to those at Venice. The candidate was to be a noble, and at least 50 years of age. The D. presided, with the right of veto, in the sittings of the great council, composed of 300 members, as also in those of a smaller one, consisting of 100. These two councils exercised the legislative power, whereas the executive was vested in the D., together with 12 *governadori* and eight *procuratori*, among these latter being always the D. retiring. During the time of his government, the D. resided in the state palace, where he was liable to the same restrictions and ceremonies which were in use at Venice. When, in 1797, Genoa was occupied by the French, the dogate ceased to exist; in 1802, the Genoese republic being, conjointly with the Ligurian, re-established, the ducal dignity was once more resuscitated; but in 1804, it disappeared forever, the republic itself having been dissolved.

DOGFISH, the popular name of some of the smaller species of shark; apparently owing its origin—like the names porbeagle, hound, etc., bestowed on others of the same family—to their habit of following their prey like dogs hunting in packs. Of the species to which the name D. is given on the British coasts, one of the most abundant is that sometimes called the common D. (*acanthias vulgaris*), also known as the picked (i.e., piked or spined) dogfish. It belongs to the family *spinacidæ*, of which one characteristic is the presence of a spine before each of the two dorsal fins; and which is further characterized by having spiracles or spout-holes; by having five gill-openings on each side all before the pectoral fins; and by having no anal fin, and no nictitating membrane of the eye. The body is long and tapering; the head flat; the snout conical; the teeth in both jaws sharp-edged, and formed for cutting. The tail-fin is longer than it is broad. The upper parts are slate-gray, the under parts yellowish-white; the skin very rough when rubbed from tail to head, but seeming quite smooth when rubbed in the contrary direction. This fish uses its spines in a remarkable manner, bending itself into the form of a bow, and unbending with a powerful spring; and "if a finger be placed on its head, it will strike it without piercing its own skin." It attains a length of 3 or 4 feet. It is very widely distributed, being found in the Atlantic, the Mediterranean, and

the South seas. It causes great annoyance to fishermen, by cutting the hooks from their lines, and still more by frightening away the shoals of herring, in which other kinds of D. share the blame with it. It sometimes appears in prodigious numbers; 20,000 have been taken in a net at one time on the coast of Cornwall; and the fishermen of the Orkneys and Hebrides sometimes load their boats to the water's edge with them. The flesh, although coarse, is dried and eaten; the livers yield oil, and the refuse parts are used as manure.—The other British dog-fishes belong to the genus *scyllium*, of the family *scylliidæ*, which have an anal fin, and two dorsal fins placed far back. They resemble in general form the species just described, and like it, they have the tail-fin longer than it is broad—they have five gill-openings on each side—the last of which, however, is over the base of the pectoral fin. They have spout-holes, and no nictitating membrane; but their teeth are very different, having a long central point, with shorter points on each side. The spotted D. of two species (*S. canicula* and *S. catulus*), both of a generally reddish-brown color, and marked with dark spots, is often taken with bait on all parts of the British coasts; and although almost never brought to market, is much used for food in the Orkney islands. It has been suggested that the fins of these and other sharks might be used for making gelatine soup, as in China.

DOG-FOX, a name sometimes given to certain small animals of the family *canidæ*, allied to the *corsac* (q.v.), and, like it, referred to the genus *cynalopex*. They have a sharp muzzle, not unlike that of a greyhound, rather large, erect, pointed ears, the pupil of the eye contracting circularly as in the dog, the tail bushy like that of a fox. They inhabit warm parts of Asia and Africa; and some, if not all of them, burrow.

DOGGER is a vessel something like a galliot or a ketch, used by the Dutch as a fishing-boat in the German ocean. It is not certain whether these were named after the Dogger-bank, or *vice versâ*.

DOGGERBANK, an extensive flat sand-bank in the middle of the German ocean, between England and Denmark, in lat. 54° 10′ to 57° 24′ n., and long. 1° to 6° 7′ east. It stretches 320 m. e.n.e., from 12 leagues e. of Flamborough head to within 20 leagues of Jutland. A prolongation runs e. towards Horn Point, Denmark. The bank is in some parts 60 m. broad, but the average breadth is 40. Towards the English coast, it is only 9 fathoms deep, in some parts it is 30, but the average depth is 15 to 20. The surrounding sea is in many parts 24 to 60 fathoms deep. The surface of the bank consists chiefly of fine sand and ooze. It is the seat of important English and Dutch cod-fisheries. At the s. end of D., in 1781, occurred the indecisive naval fight between the Dutch and English fleets, under admirals Zoutman and Parker respectively.

DOGGET'S COAT AND BADGE. These form a prize at a rowing-match on the Thames every year on the 1st of Aug. The prize is a bequest of Thomas Dogget, an actor of Drury Lane theater, who desired to signalize the accession of George I. to the throne (Aug. 1, 1715) by a prize of a waterman's coat and badge. Such is the account usually given; it would appear, however, from the following notice in the *Times* newspaper (Aug. 2, 1861), that there are several prizes rowed for on this occasion. "The first prize is a livery and badge given by Mr. Thomas Dogget, deceased, to which the Fishmongers' company add a guinea. The second and third prizes are respectively five eighths and three eighths of the interest on £260 17*s.* 3*d.*, formerly £200 South-Sea stock, left in the will of sir William Jolliffe, the amounts respectively being £4 17*s.* 9*d.* and £2 18*s.* 9*d.* The prize for the fourth man is £1 11*s.* 6*d.*, and for the fifth and sixth men each £1 1*s.*, the last three given by the company." Besides these prizes, additional sums are occasionally given by private individuals to the winner, or to the first, second, and third in the race. The competition is by six young watermen whose apprenticeships have expired the previous year; each being in a boat by himself, with short oars or sculls. The barge-master of the Fishmongers' company is ordinarily the umpire. The competition takes place when the current of the Thames, by recession of the tide, is strongest against the rowers; and the race, which is from London bridge to the Old Swan at Chelsea, always excites much local interest, being one of those manly sports in which the English take much pleasure.

DOG-GRASS. See COUCH-GRASS.

DOGLIA'NI, a t. of Piedmont, northern Italy, is situated in a mountainous district on the left bank of the Rea, 12 m. n.e. of Mondovi. D. has the remains of an old castle, but no other buildings worthy of note. Here five annual fairs are held, at which cattle, hemp, and victuals are chiefly sold. Pop. 2,000.

DOGMA (Gr.), meant originally an opinion or proposition, put in the form of a positive assertion, its truth being supposed to have been previously shown. In theology, it was understood to signify a doctrine founded on Scripture, and advanced not for discussion but for belief. But as this method of stating truth easily degenerates into the assertion of opinions without ground, and without regard to the aspect they may present to others, *dogma* and *dogmatism* have come in English to be almost synonymous with assertion without proof.

In continental theology, however, the word is still used without implying any censure, dogmas (Ger. *dogmen*) meaning simply doctrines; and this is the case in our own expression, dogmatic theology, or dogmatic, which is that branch of theology that treats

of the systematic arrangement of the doctrines of Christianity. Older names for the same thing were *Loci Theologici* and *Theologia Positiva*.—The first attempt to give a connected view of Christian doctrine was made in the 3d c. by Origen in his work *De Principiis*. He was followed in the 4th c. by Augustine, who in his book *De Doctrina Christiana*, and others, treated of the whole body of doctrine held by the church, though without any very scientific arrangement. The contributions to dogmatic, made in the 5th, 6th, and 7th centuries, were mere collections of "sentences." In the east, in the 8th c., the doctrines of the Greek church were treated by John of Damascus in a form already Aristotelian, and his work may be considered the first systematically-arranged treatise on dogmatic. He makes no mention of purgatory. His book was as influential in the Greek church as the writings of Augustine in the Latin. The regular systematizing of doctrines began with the SCHOLASTICS in the 11th c., but degenerated often into hair-splitting. The first cultivators of dogmatic theology among the Scholastics were Hildebert of Tours and Abelard, who were followed by Petrus Lombardus, Alexander de Hales, Thomas Aquinas, Duns Scotus, etc.

The era of the reformation awoke dogmatic to a new life, leading it back from Aristotle to Biblical theology. But the controversies between the different churches in the 17th c., and the too great importance attached to confessions of faith, cramped anew its freedom, and gave it again a Scholastic turn. Many of our still standard treatises on systematic divinity wear traces of these fetters, and contrast strikingly with the independence and vigor of inquiry displayed in the similar works of Melanchthon, Calvin, and other reformers. A fresh revival followed in Germany the spread of the critical philosophy of Kant, when Biblical theology rose up in contradistinction to the theology of confessions, and dogmatic was grounded on the critical interpretation of Scripture rather than on traditional formulas. Hence, however, have sprung widely diverging views. One party still held fast by the existing confessions; another looked chiefly to the contents of Scripture; while a third subjected confessions and Scripture alike to the test of reason. Besides these, there arose in more recent times, a school of dogmatic theologians, formed on the philosophical systems of Jacobi and Schelling, who looked for the essence of religion in the human soul itself, and considered Christianity as the historical revelation of it. Of this school, Schleiermacher, and in some respects Neander and Rothe also, may be considered the representatives; and of all the German schools, it is that which seems to be exercising the greatest influence on the speculative theology of Britain. An important contribution to this department of theology was Peter Lange's *Philosophische Dogmatik* (2 vols., Heidelb. 1849–51). The dogmatic of D. F. Strauss is constructed from the Hegelian point of view, and in its leading results comes back to the system of Spinoza.

It deserves remark that Christian dogmatic and morality, which it had been the custom to discuss separately since the 17th c., have recently been treated in combination by Nitsch and Beck. The scientific investigation of Christian doctrine in Germany has not been confined to the Protestant churches. A number of Catholic theologians have occupied themselves with this branch of sacred science; some, as G. Hermes of Bonn, inclining to freedom of investigation, and others, as Liebermann, to the defense of the usual formulas.

The HISTORY OF DOGMAS OR DOCTRINES has been raised in Germany to the rank of a distinct branch of sacred science. In this country, the facts with which it deals have received only passing notice in treatises on systematic theology, and in ecclesiastical history have been considered as the "internal history of the church." The pursuit of this branch of inquiry is characteristic of Protestantism; in the Catholic church it is considered as endangering the unity of the faith. Many Protestants even dislike the idea of a "development" of Christian doctrine, which seems to be involved in its having a history. It is not necessary, however, to believe that doctrines hitherto absolutely unknown or denied, came from time to time to be embodied in the orthodox creed of Christendom. See DEVELOPMENT. Though this may be denied, it remains an indisputable fact that the several doctrines came one after the other into prominence in the consciousness of the church; and that in each period of her history there is some one leading doctrine which assumed an importance, as if it were the mainstay of Christianity. To depict this succession or evolution of views with their struggles and modifications, and trace the different ways in which the several doctrines were at different periods formulated and embodied in the creeds, is the object of a history of doctrines (Ger. *Dogmengeschichte*). There is, of course, room for great variety in the method of treating such a subject. Among the most important works on this subject is Neander's, edited by J. L. Jacobi, 1856 (English trans. 1858), and that of F. C. Baur (1847), whose name marks an era in this branch of study.

DOGS, ISLE OF, or *Poplar Marshes*, a small peninsula in the co. of Middlesex, England, formed by a circuitous winding of the Thames, is situated in the vicinity of London, distant 3¼ m. e.s.e. from St. Paul's cathedral. It is about a mile long, and three-quarters of a mile broad. In what may be called the isthmus of the peninsula are situated the West India docks. It is said that the isle of Dogs derives its name from the circumstance that the king's hounds were formerly kept here.

DOGS. See ANDIRON.

DOG-SHORE. See LAUNCHING.

DOG'S-TAIL GRASS, *Cynosurus,* a genus of grasses having a pretty close spike or ear, each spikelet with two equal glumes and 3 to 5 florets, and beneath each spikelet a comb-like bract or involucre. The species, which are not very numerous, are chiefly natives of Europe and Asia. Two are found in Britain, but one only is common and valuable, the CRESTED D. G. (*C. cristatus*), which forms an important part of almost all good pastures, and is particularly esteemed for sheep pastures and lawns, for the improvement of which it is often sown. Its herbage is fine and close, and its deep roots secure it against droughts, which cause many other grasses to wither; but the herbage is not sufficient in quantity to make it desirable for hay. The comb-shaped bract connected with each spikelet of this common grass is a very interesting and beautiful object. The seeds are small, shining and yellow, whence the name gold-seed sometimes given to this grass by farmers.

DOGSTAR. See SIRIUS, *ante.*

DOG-WATCH, on shipboard there are two, usually from 4 to 6, and from 6 to 8 P. M.

DOGWOOD, or DOGBERRY, the name usually given to some of the arboreous and shrubby species of the genus *cornus.* See CORNEL. The common D. of Europe (*C. sanguinea*), a native of Britain and many parts of the continent, and also of the n. of Africa, is a shrub of 4 to 15 ft. in height, with ovate leaves, and terminal cymes of greenish-white flowers, which have an unpleasant odor. The leaves become of an intense dark-red color before they drop off in autumn. The wood makes the very best charcoal for gunpowder. It is very hard, and is made into skewers for butchers and cooks, and into cogs for wheels. The young wood was, in former times, in request for the making of arrows. The fruit, which is small, dark purple, and very bitter, yields an oil said to be equal to that of the olive, and to the amount of 34 per cent of its weight. This oil is used in France for lamps, and for the manufacture of soap. The D. of North America (*C. florida*) is a small tree, found in the United States, from lat. 43° to Florida, with oval leaves, and small yellowish flowers, which are surrounded by large white roundish bracts. The berries are red, and remain on the tree most of the winter. The flowers appear before the leaves, and their large white bracts are amongst the ornaments of the American woods in spring. The tree attains a height of 20 to 30 ft., with a trunk 8 or 10 in. in diameter. The wood is white, hard, fine-grained, much esteemed and used for inlaying and ornamental work. The bark is very successfully employed in the cure of intermittent fevers. It is also a valuable tonic. It is one of the most valuable medicinal products of North America. The barks of several other North American species of *cornus* possess similar properties. JAMAICA D. is *piscidia erythrina,* of the natural order *leguminosæ,* suborder *papilionaceæ,* a good timber-tree, with hard and resinous wood, which lasts well either in or out of water; the bark of the root powerfully narcotic, used for stupefying fish, and also for relieving toothache, being applied to the tooth in the form of a saturated tincture, or taken into the stomach as a powerful sudorific.

DOILEY, or DOILY, a small napkin used at table for putting glasses upon during dessert. Some are highly ornamented. The name is said to be derived from the original maker; but more probably it is a modification of the Dutch *dwaele,* a towel, and was introduced along with the article from Holland.

DOIT, a small copper coin current in Scotland during the reigns of the Stuarts. It was a Dutch coin (*duit*), and in value the 160th part of a guilder, which, estimated at 20*d.* sterling, would make the D. equal to the eighth of an English penny, or half a farthing. By some authorities it is said to have been worth only the twelfth of a penny; in reality, it is difficult to say what was its worth, for being imported, like many other coins of the period, from Holland, it would rise and fall in value according to the scarcity of money. The D. must have been common in the early part of the reign of James VI. The kirk-session of Perth (16th April, 1582) "ordains James Sym to give the witch in the tolbooth 8 doits in the day" for subsistence.

DOKKUM, a t. in the Netherlands, province of Friesland, lies 12 m. n.e. from Leeuwarden, on the Ee (pronounced *Ay*), which cuts it into two irregular parts. Within the town is a broad haven, suited both for sea-going and inland ships. There are several regularly built streets and many neat houses. The trade in flax, cattle, wool, and chickory is extensive. In the Dokkummerdiep, shrimps are largely taken. Ship-building, gin-distilling, beer-brewing, carding wool, etc., are principal industries. There are a grammar and other good schools. Pop. '77, 4,538.

DO'KOS, a race of blacks in Africa, s. of Abyssinia, almost dwarfs in size. They are in a wild state, and are the favorite prey of slave-stealers.

DOLABEL'LA, PUBLIUS CORNELIUS, b. about 70 B.C.; a Roman gen. of violent and wicked character, often involved in criminal acts, from which he was extricated by Cicero. When 30 years old he drove away his wife Fabia, and married Tullia, Cicero's daughter, against the father's consent. Being heavily in debt he fled from Rome to Cæsar's camp, and took part in the battle of Pharsalus. Returning to Rome, he gained immunity from his debts by securing for himself an election as tribune, and his first legislative act was to propose a law canceling all debts. He was so troublesome in Rome that, to remove him, Cæsar made him a gen. in Africa. Dolabella was ambi-

tious to be consul, and Cæsar promised him the office; but Antony's opposition delayed the fulfillment, and before it could be arranged, Cæsar was murdered. Dolabella at once seized the insignia of office, made friends with the assassins, and was confirmed in the office which he had usurped. He threw down an altar erected to Cæsar, and crucified those who would offer sacrifices upon it. Antony sent him in command of an expedition against the Parthians, where his cruelty and rapacity added infamy to a name already infamous. He tortured Trebonius at Smyrna for two days to force him to disclose the hiding-place of his treasures, and then murdered him. Hearing of this, the senate outlawed Dolabella, and sent Cassius to take his place. Having no further hope of power, Dolabella caused one of his own soldiers to kill him, 43 B.C.

DOLA'BRA, a rude ancient hatchet. They are represented on the columns of Trajan and Antoninus, and abound in all museums. When made of flint, which was their earliest and rudest form, they are usually called *celts* (q.v.).

DOLCÉ, an Italian term in music, meaning softly and with tenderness

DOL'CE, LUDOVICO, or LUIGI, 1508-68; an Italian author, and a voluminous writer. He translated almost anything and everything from the Greek and Latin, and wrote original works, in all 70 in number. The best known is *Marianna*, a tragedy from the life of Herod, reproduced in French by Voltaire, and still on the stage. He also wrote the lives of Charles V. and Ferdinand I., many other dramas, and miscellaneous works.

DOLCI, CARLO, or CARLINO, a celebrated painter of the Florentine school, was b. at Florence in 1616. He received his first instructions in art from Jacopo Vignali, a pupil of Roselli, and a remarkably skillful teacher. After an uneventful life spent entirely in his native city, D. died Jan. 17, 1686. His works, which consist chiefly of madonnas and saints, exhibit the character attributed to him. The faces are full of a pleasing and tender softness, which, however, is often carried so far as to rob them of all character. D.'s drawing is generally correct, his coloring exquisitely delicate and transparent, and in the nicety and laborious care of his finish he approaches the most characteristic examples of the Dutch school. His works are numerous, and scattered over all Europe. Besides his madonnas, the most famous are his "St. Cecilia," "Christ Blessing the Bread and Wine," "Herodias with the Head of John the Baptist," and "Christ on the Mount of Olives."

DOL'CINITES, or DULCINISTS, a sect established in Italy in the 13th c.; they were opposed to the popes, and their doctrines were similar in many respects to those of the spiritual Franciscans. In 1307, Dolcino, the founder of the sect, with some of his followers, was burned at the stake.

DOLE (Lat. *dolus*, guile), in Scotland, the amount of conscious guilt or evil intention which is necessary to make a legal crime. A person incapable of consent is also incapable of dole—*doli incapax*, as it is technically called. The corresponding phrase in England is *felonious intent*.

DÔLE, a well-built t. of France, in the department of Jura, 28 m. s.e. of Dijon. It is delightfully situated on a vineyard slope rising from the right bank of the river Doubs, and the environs are tastefully laid out in gardens and promenades. The principal building is an immense cathedral, named, in honor of the Virgin, *Nôtre Dame*. The chief manufactures of D. are hosiery, tiles, pottery, chemical products, and beer; there are also iron-smelting furnaces, flour-mills, and some trade in corn, wine, wood, marble, and iron. Pop. '76, 12,009. D. is the *Dola Sequanorum* of the Romans, of whose presence the ruins of two aqueducts, an amphitheater, several temples, and the "street" or road which passed from Lyon through D. to the Rhine, still give indications. There are also the remains of a castle built by Frederick Barbarossa in the 12th century. D. is likewise memorable for having sustained several sieges.

DOLE-FISH seems to be that fish which fishermen employed in the north seas do of custom receive for their allowance, 35 Hen. VIII. c. 7.

DOLES AT FUNERALS; these are of great antiquity. St. Chrysostom speaks of them as being given to procure rest to the soul of the deceased. On this ground, as well as on the score of general benevolence, the practice of making gifts to the poor at funerals was common until comparatively recent times; for it was continued, sometimes on a munificent scale, long after the custom of praying for the dead had been abandoned on the introduction of reformed doctrines. Nichols, in his *History of Leicestershire*, speaking of Strathern in Framland Hundred, observes of this usage: "In 1790, there were 432 inhabitants, the number taken by the last person who carried about bread, which was given for *dole* at a funeral; a custom formerly common throughout this part of England, though now fallen much into disuse. The practice was sometimes to bequeath it by will; but, whether so specified or not, the ceremony was seldom omitted. On such occasions, a small loaf was sent to every person, without any distinction of age or circumstances, and not to receive it was a mark of particular disrespect." These doles, whether in money or in articles of food and ale, were at one time common not only in England, but in Wales, Ireland, and Scotland; and the custom may be said to have represented, in a simple state of society, that form of benevolence which, in the present

day, consists of bequests to hospitals and other public charities. By some writers, the custom of making doles at funerals is traced to the sin-offering of the Hebrews. See Brand's *Popular Antiquities*, edited by Ellis.

DOLET, ÉTIENNE, 1506–46; a French writer and printer, said to have been an illegitimate son of Francis I. In 1537, he obtained a privilege for ten years to print any works of his own or which had received his supervision. His liberality of sentiment was manifest from his press issues, which ranged from the New Testament in Latin to Rabelais in French. This liberality brought upon him the persecution of the Roman Catholic church, and after long watching he was arrested as a relapsed atheist, put to the torture, and burnt to death; the alleged cause being his insertion in Plato's *Axiochus* of the words "Nothing at all," implying a denial of the immortality of the soul; and yet Plato's book more exactly and positively makes that denial. Dolet was an earnest advocate for the circulation of the Scriptures in the common language of the people.

DOLGELLEY ("dale of hazels"), the capital of Merioneth, North Wales, near the center of the co., and the largest town in it, is situated on the banks of the Wnion, 208 m. n.w. by w. of London. It lies in a rich and picturesque valley, at the foot of Cader Idris, and during the summer months is much frequented by English and foreign tourists. It has manufactures of coarse woolens and flannels; its Welsh tweed is in great repute and demand throughout the kingdom; lamb and kid skins are tanned and dressed; and in the vicinity there are fulling-mills and bleach-greens. Pop. '71, 2,217. Here, in 1404, Owen Glendwr held a parliament, and signed a treaty of alliance with Charles, king of France.

DOL'ICHOS, a genus of plants of the natural order *leguminosæ*, sub-order *papilionaceæ*, closely allied to *phaseolus* (see KIDNEY BEAN), and chiefly distinguished by the extension of the base of the standard so as to embrace the wings of the corolla at their base. The genus includes a considerable number of species, some of them shrubby, some annual, and some perennial herbaceous plants. Some of them have beautiful flowers, and some of the herbaceous species are cultivated on account of their seeds, which afford a kind of pulse; or of their young pods, which, like those of the kidney bean, are boiled for the table. Among these are *D. lablab*, a native of India and Egypt (which has been made the type of a separate genus, *lablab*); *D. Nankinicus* (or *lablab Nankinicus*) a Chinese species; *D. lubia*, a native of Egypt; *D. sesquipedalis*, a native of America; *D. soya* or *soja hispida* (the soy bean), *D. catiang*, and *D. uniflorus* (horse gram), natives of India: *D. sphaerospermus* (calavana or black-eyed pea), a native of the West Indies. In the climate of Britain, even the most hardy kinds require the aid of a little artificial heat, and they are reckoned inferior to other kinds of pulse or garden vegetables of easier cultivation. The well-known Chinese sauce or ketchup called soy (q.v.) is made from the soy bean. Allied to D. is the genus *canavalia*, to which belong the SWORD BEANS of India. *C. gladiata*, the commonly cultivated species, has pods 2 ft. long. Another allied genius is *psophocarpus*. The seeds of *p. tetragonolobus*, formerly *D. tetragonolobus*, are used in the Mauritius as peas are in Britain; and its pods and tuberous roots are common Indian esculents. Some species of *pachyrhizus*, also an allied genus, are remarkable for their tuberous roots, as *p. angulatus* (formerly *D. bulbosus*), a native of India, now cultivated in South America and other warm countries, which produces pleasant turnip-like tubers; and *P. trilobus*, which has tubers 2 ft. long and nearly cylindrical, much used as a boiled vegetable in China and Cochin-China.

DOLICOCEPH'ALIC, long-headed, a designation of human skulls which have the diameter from front to back much greater than the transverse diameter. Such are the heads of certain Australian and West African races. The opposite conformation is called *brachycephalic*, or short-headed.

DOLI'NA, a t. of Austrian Galicia, in the circle of Stryi, 60 m. s. from Stryi, on an affluent of the Swica. It has extensive salt-mines. Pop. of town and commune about 7,000.

DO'LIUM, a genus of gastropod mollusks having shells spirally furrowed, resembling the hoops on a cask. More than a dozen species are found in the warm seas of the east, and seven fossils are known.

DOLL, an imitative baby used as a toy by girls. The word doll is of doubtful derivation; possibly from *idol;* in French, the name is *poupée;* in German, *puppe*, from Lat. *pupa*, a girl, a doll. The use of dolls dates from the most remote times, and is common in all countries, barbarous as well as civilized, because it springs from that love of nursing and fondling infants which is implanted by nature in the female character. Precisely as a child in a princely mansion in England fondles a finely dressed doll worth a guinea, so does the child of an African or Esquimaux take delight in a piece of wood or bone carved rudely in the form of a baby—in fact, girls in the humbler ranks may sometimes be seen hugging and talking to a bit of stick decorated with a few rags, as if it were a live child. This is not the place to discuss this curious psychological phenomenon; it is enough to say that the love of dolls is a perfectly legitimate feeling, and its exercise helps to cultivate not only tender affections, but taste as regards the making and management of children's dresses. Accordingly, the keeping of a doll becomes a

part of the home education of girls; and is recognized to be so by the universality of the practice.

As in the case of most other toys (q.v.), dolls were at one time imported into Great Britain chiefly from the Netherlands; and hence not an unusual name for a doll was a Flanders baby. These old Flemish or Dutch dolls were made of wood, with neatly formed faces and flashy dresses, the cheaper kinds having slender wooden legs. Latterly, there have been great improvements in the making of dolls, and in England it has assumed the character of a manufacture; but there are still large importations from the countries on the Rhine, France, and Switzerland. In these continental countries, women and children are mostly engaged in the manufacture. Some carve the heads and bodies, others paint the faces and necks, others prepare legs and arms, and a different class cut out, sew, and put on the dresses. These operations are seldom executed in one manufactory. Usually, dealers buy the fragments so far prepared by villagers, and get them put together in a wholesale way. As the time employed in the preparatory processes is scarcely of any marketable value, the prices of fragments are most insignificant. Hence, as regards all the cheap kinds, with painted faces and ringlets, dolls can be imported at a cost below that at which they could be executed by hand-labor in England. When, however, we come to dolls of a superior kind, with molded wax or composition faces, arms and feet, glass eyes, stuffed bodies, flaxen ringlets, and gauze dresses, the English, by their machinery and capital, carry off the trade. In London there is a considerable number of doll-makers, manufacturing dolls of wax, gutta-percha, india-rubber, etc. In this as in other trades, there is an economic division of labor; there are dolls' head-makers, dolls' leg and arm makers, doll sewers, doll stuffers, dolls' wig-makers, dolls' eye-makers, and doll dressers. For some dresses, remnants of calico, gauze, silk, and other materials, are procured from shops; but for fashionably dressed dolls, much in demand, it is necessary to buy goods on a large scale. The extent to which doll's glass-eyes are manufactured appears surprising. Some years ago, in evidence before a committee of the house of commons, a glass-manufacturer at Birmingham stated that he had received, at one time, an order for £500 worth of dolls' eyes. The cheaper dolls' eyes are simply small hollow glass-beads, made of white enamel, and colored with black or blue, but without any attempt at variety or effect; while those eyes of a higher quality have a ring of color to represent the iris. The introduction of wires and mechanism to make the eyes move or wink at pleasure, and also to cause the doll to utter the sounds "papa" and "mamma," have been highly appreciated steps in advance, with a corresponding rise in prices. It is stated in the experience of the trade, that since Victoria came to the throne, blue eyes for dolls have been in the ascendant in England; but that black eyes find the best market on the continent, especially for Spanish dolls. Black dolls are made for export to America, where they are in request by girls of negro parentage, and the introduction of gutta-percha is favorable for this branch of the trade. Composition-heads are usually made of *papier maché*, cast in a mold, and waxed and painted to represent the features.

One of the most attractive stalls at the great exhibition in 1851, was that which contained the dolls of Mme. Montanari, a London manufacturer. Referring to this stall, the jury report said: "It consists of a series of dolls, representing all ages, from infancy to womanhood, arranged in several family groups, with suitable and elegant model furniture. These dolls have the hair, eyelashes, and eyelids separately inserted in the wax, and are, in other respects, modeled with life-like truthfulness. Much skill is also evinced in the variety of expression which is given to these figures, in regard to the ages and stations which they are intended to represent." Some of those dolls were sold at five guineas undressed; and at a greatly increased price when richly attired. The same exhibition showed how much skill is now exercised in making rag-dolls, in which almost every part is formed of textile materials.

DOLLAR is the name of a coin, and the unit in the monetary system, of the United States. The origin of the name deserves notice. *Dollar* is a variety of the Ger. *thaler*, Low Ger. *dahler*, Dan. *daler;* and the word came to signify a coin thus: About the end of the 15th c., the counts of Schlick coined the silver extracted from their mines at Joachims-thal (Joachim's valley) into ounce-pieces, which received the name of Joachims-thaler—the Ger. adjective from the name of the place ("Joachims-dalers," as it were). These coins gained such a reputation, that they became a kind of pattern; and others of the same kind, though made in other places, took the name, only dropping the first part of the word for shortness. The American dollar is taken from the old Spanish dollar or piastre, and is only slightly less. It was formerly only of silver; but in 1873 the gold dollar was made the unit of value in the United States. In 1878, however, silver was "remonetized," and so now shares with gold the rank of standard money. Since 1837, the silver dollar is required to contain 412½ troy grains, or 26.4246 Fr. grammes, the fineness of which is fixed at $\frac{9}{10}$, i.e., $\frac{1}{10}$ of it is alloy. In the standard silver of Great Britain, $\frac{1}{12}$ is alloy. The United States dollar is generally estimated in exchange at 4*s.* 2*d.* sterling. Besides dollars, there are coined in silver, *half-dollars*, *quarter-dollars*, *dimes* ($\frac{1}{10}$ dol.), *half-dimes* ($\frac{1}{20}$ dol.), and three-cent pieces. With regard to these, it was enacted in 1853, that the weight of the half-dollar shall be 192 grains, and that of the others proportional to this; and that such silver coins shall be legal ten-

ders for all sums not exceeding five dollars. Accounts are kept in dollars and cents, or hundredths of a dollar, which are written thus: $13.78—thirteen dollars and seventy-eight cents. The standard gold of the United States is of the same fineness as the silver —namely, $\frac{9}{10}$; and of this are coined double-eagles, eagles, half-eagles, and quarter-eagles; of 20, 10, 5, and 2½ dollars, besides three-dollar and one-dollar pieces. The dollar or thaler in Germany had various values. That of Prussia, which was most current, was equivalent to 3*s.* sterling.

DOLLAR, a village in Clackmannanshire, on the right bank of the Devon, 10 m. e.n.e. of Stirling. It lies in a plain under the Ochills (q.v.). Coal and iron occur in the vicinity. D. is noted for its academy, founded in 1818 under the will of capt. M'Nab, a native of the parish, who bequeathed £80,000 for the purpose. The academy was incorporated by act of parliament in 1847, and has a principal and 19 teachers in the classics, arts, modern languages, etc. The minister and kirk-session of D. were the original patrons and governors, but in 1847 the trust was extended so as to include the lord-lieutenant, vice-lieutenant, convener, and sheriff of the county, the principal of the university of Edinburgh, county gentlemen, two members of the presbytery of Stirling, and two representatives appointed by the parliamentary electors of Dollar. Pop. '71, 2,123. The principal industrial feature of D. are its many famous bleacheries on the banks of the Devon. A mile n. of D. are the fine ruins of castle Campbell, in a wild romantic situation, on the top of a high almost insulated rock, in a hollow in the bosom of the Ochills, amid mountain rivulets and bosky woods. It long belonged to the Argyle family. John Knox is said to have resided in the castle under the protection of Archibald, fourth earl of Argyle, the first Scotch noble to embrace Protestantism publicly.

DOLLART, THE, a gulf of the German ocean, at the mouth of the river Ems, between Hanover and Holland. It is about 10 m. in length by 7 in breadth, and was formed by inundations of the sea, the first of which took place in the latter half of the 13th c., and the last in the 16th century. By these watery inroads a large number of villages were submerged, and thousands of persons perished.

DÖLLINGER, JOHN J. IGNATIUS VON, one of the most distinguished of the Roman Catholic divines of modern Germany, was b. at Bamberg, Feb. 28, 1799. He was educated at Würzburg, where he received holy orders. For a time he was engaged in parochial duties in his native diocese; but having manifested a peculiar fitness for a literary life, he was appointed a professor at Aschaffenburg, whence, in 1826, he was removed to the chair of ecclesiastical history in the newly established university of Munich. From the first he was distinguished as a ready and profound writer. He inaugurated his new professorial career by a work on *The Doctrine of the Eucharist during the First Three Centuries*, in 1826, and a *History of the Reformation*, being a continuation of Hertig's *Handbook of Church History*. He subsequently undertook a new *History of the Church* (vol. i. 1833, vol. ii. 1835), which was speedily translated into French, and also into English, and was carried down to the 15th c.; with a compendium which came down to the reformation (1836–43). His very learned and suggestive essay on *The History, Character, and Influence of Islamism* appeared in 1838, and *The Reformation, its Internal Development and Effects*, in 3 vols., in 1846–48. The design of this work, which consists almost entirely of extracts (connected by a very slight thread of narrative) from the writings of the leading reformers and other contemporary Protestant divines, is to present in the words of the actors in the great religious drama of the 16th c., a picture, doctrinal, moral, social, and political, of the reformation and its results; but as the great body of the authorities (exclusively Protestant) are German, the interest of the work is mainly national.

For a time, D. undertook the chair of dogmatic theology, in which capacity he delivered lectures on "The philosophy of Religion," on "Symbolism," and on "Patristic Literature," none of which, however, have been published. He was a frequent contributor to the *Historisch-politische Blätter;* he published several pamphlets on subjects of occasional interest; and was one of the chief contributors to the Catholic cyclopædia, entitled *Kirchen-Lexicon*, in which his articles on Luther, on Bossuet, and on Duns Scotus attracted much attention. In the politico-religious movement of 1846–47, D. was elected to represent the university of Munich in the Bavarian chamber; but being deprived of his professorship, he became disqualified to sit in the chamber. In the parliament of Frankfort, in 1848, he was recognized as the leader of the Catholic party. Most of the measures of importance bearing on the relations of church and state which (however ineffectively) were originated in that assembly were prepared or suggested by him. In 1849, he was restored to his professorship at Munich, and also to his place in the Bavarian chamber, which he held till 1852. Since that year, he has devoted himself entirely to theological literature. His work entitled *Hippolytus und Kallistus* (1853) is a masterpiece of patristic criticism; and his *Heathenism and Judaism, the Vestibule of the History of Christianity*, is a most masterly survey of the religious, moral, and social condition of the world at the advent of our Lord. It was quickly followed by *The First Ages of Christianity*, to which it had been designed as an introduction. During the early discussions on Italian unity, D. delivered an address at Munich, which was represented as hostile to the temporal sovereignty of the pope. In order to explain his real

opinions on that important question, D. published, in 1861, an elaborate work entitled *The Church and the Churches*, which was partly a comparative survey of the condition of the non-Catholic communions, and of the church, and partly a *résumé* of the history and condition of the papal states; showing that, while the temporal sovereignty was the means providentially established for maintaining the spiritual independence of the papacy, yet it was by mo means essential; that the papacy long existed without it, and that even if it were overthrown, Providence would devise another means of attaining the same end. The second part was a criticism of the administration of the papal states, which is understood to have given dissatisfaction to the authorities, as being, although well meant, inopportune, and from this inopportuneness, unfriendly. A similar feeling is said to have been drawn forth by the part taken by Dr. D. in reference to the "Catholic union," some of the principles of which were supposed to trench dangerously upon the province of authority in matters of religious inquiry; but his orthodoxy and learning were unquestioned, and his influence, especially among Catholics of his own nationality, was very great until the approach of the time for the celebration of the council of the Vatican. It being understood that the doctrine of the infallibility of the pope would form a subject of discussion, D. took an active part in organizing an opposition. Articles which appeared in the *Augsburg Gazette*, in Mar., 1869, and which were reprinted more fully under the *nom de plume* "Janus," were ascribed to him or to his influence; and during the discussions of the council, he was entirely identified with the party opposed to the Ultramontane view. On the publication of the decree of the council, which defined the infallibility of the pope in all doctrinal teachings on faith and morals addressed *ex cathedra* to the universal church, D. refused to accept the doctrine. In Oct., and in depreciation of the impending censure of excommunication by the archbishop of Munich, he published an address to the archbishop, in which he claimed to be heard in the synod of German bishops, or before a committee of the cathedral chapter. His declaration on papal infallibility called forth replies from Dr. Hergenröther and others, and was accepted, on the other hand, by the so-called old Catholic party. D. was elected rector of the university of Munich (Feb. 29, 1817) by a large majority of votes. Persisting in his refusal to submit to the authority of the council, he was excommunicated by the archbishop of Munich on the 18th of April, 1871. In 1874, Dr. D. presided over the "old Catholic conference" at Bonn, where he frankly declared that he and his colleagues did not consider themselves bound by the council of Trent. He also introduced a declaration, adopted unanimously, that the eucharistic celebration in the church is not a continuous repetition or renewal of the great propitiatory sacrifice. His literary activity is little diminished. In relation to the prophecy of Orval, and other French prophecies supposed to bear upon the late war with Germany, he published recently an elaborate essay on *Prophecies and the Prophetical Spirit*, which has been translated into English by Alfred Plummer. In addition to his accomplishments in book-learning, Dr. D.'s attainments as a linguist, both in ancient and modern languages, are very remarkable. In 1871, D. received the honorary degree of D.C.L. from Oxford university; and in 1872, that of LL.D. from Edinburgh. In 1872, the king of Bavaria conferred on him the order of merit; and in 1874, the emperor of Germany the order of the red eagle, second class. In 1873, he was appointed president of the royal academy of science at Munich.

DOLLOND, JOHN, a distinguished optician, inventor of the achromatic telescope, was descended from a French refugee family, and b. in London, June 10, 1706. His father was an operative silk-weaver, in humble circumstances, and D. was also brought up to that occupation. Engaged at the loom all day, he devoted great part of the night to his favorite studies of mathematics, optics, and astronomy. Not content with these, he turned his attention to the most varied subjects, made himself acquainted with anatomy, and even theology, and went so far in the study of the classical languages as to translate the Greek Testament into Latin. French, German, and Italian also, he knew well. He apprenticed his eldest son, Peter, to an optician; and after the latter had established himself in business on his own account, he was joined by his father in 1752. John D. now devoted himself to the improvement of the dioptric telescope, in which he was encouraged by the most distinguished scientific men of the time. After a series of well-contrived experiments and researches, carried on for several years, he succeeded in constructing lenses that produced images without any colored fringe. See ACHROMATIC. This was undoubtedly the greatest improvement that the telescope had received since its first invention. The memoir (published in the *Philosophical Transactions* for 1758) in which he gave an account of his investigations, was rewarded by the council of the royal society with the Copley medal. In 1761, D. was elected a fellow of the royal society; his death took place on the 30th of Nov. of the same year. His two sons continued to carry on the business with great reputation and success.

DOLLY SHOP, the name popularly given in London to a shop where rags and other kinds of old articles are bought, and over the door of which a black doll is usually suspended. It is understood that dolly shops are in many instances a kind of unlicensed pawnbroking concerns. For small articles a few pence are given, on the understanding that the seller can buy them back at an advance some days after. In Edinburgh and

Glasgow, shops of this kind are known as *wee pawns*, and give some concern to magistrates and police.

DOLMEN, the name given in France to what British archæologists call a cromlech (q.v.). The dolmen, properly so called, consists of *one* large unhewn stone resting on two or more unhewn stones placed erect in the earth. But the name is sometimes applied to structures where several blocks are raised upon pillars, so as to form a sort of gallery. One of the most remarkable monuments of this kind is the *Pierre Couvert*, about a mile and a half from Saumur. It is 64 ft. long, about 15 ft. wide, and about 6 ft. high. It has four stones on each side, four on the top, and one at each end. The stone at the e. end has fallen down; all the others appear to be as they were originally placed. Some of them are of great size, one on the roof measuring 24 ft. in length, and more than 2 ft. in thickness. All are of the sandstone of the neighborhood. The floor is unpaved. Dolmen is believed to be a Celtic word, signifying a stone table. The monuments to which the name is given are supposed to be the sepulchers of the ancient Celts or Gauls.

DO'LO, a t. of northern Italy, in the government of Venice, and 12 m. w. from Venice, on the Brenta and Bretano. It is a station on the railroad between Padua and Venice. In the vicinity are many villages of the Venetian nobility. Pop. 4,468.

DOLOMIEU, DÉODAT-GUI-SYLVAIN-TANCRÈDE GRATET DE, 1750–1801; a French geologist and mineralogist. He was one of the knights of Malta when a boy, and fought a duel with and killed a brother knight, for which he was condemned to death, but was saved in consequence of his youth. He then turned his attention to science, and visited Spain, Sicily, and the Pyrenees. He minutely described the earthquake in Calabria in 1783, and in later years studied the Alps, where he discovered the mineral "Dolomite," which is named after him. He became professor in the school of mines and a member of the institute from its formation. In 1798, he was on the scientific staff of Bonaparte's expedition to Egypt. Here he lost his health, and on the way home was left at Messina, where he was an object of political hatred because he had revealed to the grand master of Malta the designs of the Neapolitans against that island. He was confined in a wretched dungeon, clothed in rags, and given only a bed of straw. There he was kept 21 months. Denied writing materials, he made a pen from a piece of wood, and with the smoke of his lamp for ink, wrote on the margins of his Bible—the only book he possessed—his *Traité de Philosophie Minéralogique*, and *Memoire sur l'Espèce Minerale*. At the conclusion of the treaty between France and Naples, he was released, and took the chair of mineralogy in Paris, made vacant by the death of Daubenton.

DO'LOMITE, BITTER SPAR, or MAGNESIAN LIMESTONE, a mineral consisting of carbonate of lime and carbonate of magnesia in somewhat variable proportions, sometimes nearly equal, the carbonate of lime often greatly preponderating; and usually containing also a little—sometimes nearly 20 per cent—of carbonate of iron. It is softer than limestone; usually white; sometimes gray, yellow, or brown; and occurs compact, cellular, or porous, granular, foliated, and crystallized. Its crystals are usually rhomboidal, and its cleavage is rhomboidal. It is readily distinguished from limestone by its feeble effervescence in acids. It occasionally occurs in veins, accompanied with quartz, calcareous spar, etc., but also as a rock, and forms mountain masses. It is often used as a building stone; the new houses of parliament are built of it. It is also burned and made into mortar, but the lime obtained from it remains much longer caustic than lime from common limestone; and if spread on land in the same quantity, impairs rather than increases the fertility of the soil.—*Brown spar* (q.v.) is a variety of dolomite.

DOLOMITE MOUNTAINS. The distinctive peculiarities of dolomite mountain scenery may be seen on the grandest scale in the s.e. of Tyrol and in the Carinthian Alp masses. When the dolomites *par excellence* are spoken of, it is the D. M. of this region that are meant.

DOLPHIN, *Delphinus*, a genus of *cetacea*, the type of a family, *delphinidæ*, which is characterized by a moderate size of head—differing in this from the *catodontidæ* or *physeteridæ* (see CACHOLOT)—and usually by having numerous simple and conical or nearly conical teeth in both jaws, although some of the species lose those of the upper jaw at an early age. The blow-hole is single. The family *delphinidæ* includes, along with the dolphins, porpoises, grampus, etc., many animals, which on account of their larger size are very commonly called *whales*, as the beluga or white whale, the caaing whale, the bottlehead, etc. It contains also a few species, which inhabit, not the ocean, but tropical and sub-tropical rivers, as the soosoo of the Ganges and the *inia* of the Amazon. The true dolphins have the snout prolonged into a rather slender beak, which is not only abruptly separated from the convex forehead, but even by a marked furrow. Both jaws are furnished with numerous equal teeth. The species are numerous, most of them recently discovered, and none of them apparently having the very wide geographical range formerly ascribed to the common D. (*D. delphis*), with which they were confounded. They are very voracious animals, and are said to prey not only on fishes, medusæ, cephalopods, etc., but even on the wounded and feeble of their own species. They live, however, in herds, which often delight the voyager in the ocean solitude by the gambols which they perform around his ship. "They may be discerned at a great distance; as they are con-

tinually leaping from the surface of the sea, an action which, as it seems to have no obvious object, is probably the mere exuberance of animal mirth. When a shoal is seen thus frolicking at the distance of a mile or two, in a few moments, having caught sight of the ship, down they come trooping with the velocity of the wind. When arrived, they display their agility in a thousand graceful motions, now leaping with curved bodies many feet into the air, then darting through a wave with incredible velocity, leaving a slender wake of whitening foam under the water; now the thin back-fin only is exposed, cutting the surface like a knife; then the broad and muscular tail is elevated as the animal plunges perpendicularly down into the depth, or dives beneath the keel to explore the opposite side.

The common D. is found in the Mediterranean and in the northern Atlantic ocean. It is usually not more than 6 or 8 ft. long, but individuals have been seen of 10 feet. The body tapers towards the tail. The tail is crescent-shaped, and about a foot in breadth. The beak is about 6 in. long. The blow-hole is crescent-shaped, with the horns directed backwards. The color is blackish on the back, grayish on the sides, and a satiny glistening white beneath. The female D. brings forth a single young one at a time, which she suckles and nurses with great care. Although an inhabitant of the ocean, the D. emits a peculiar murmuring or suppressed lowing cry. The flesh of the D. was formerly considered a delicacy, and sailors still regard the capture of one as a happy event.

From the form of its beak, the D. receives from the French the names of *bec d'oie* (goose-beak) and *oie de mer* (goose of the sea). It was very differently regarded and designated by the ancient Greeks: it was their *hieros ichthys* (sacred fish), was invested with many fabulous attributes, and was the subject of many mythological legends. It was supposed to be peculiarly friendly to men. It was sacred to Apollo, who was worshiped at Delphi with dolphins for his symbols. The figure of the D. appears on many ancient coins and medals: it is said to have been borne on the shield of Ulysses; it early appeared on the shield of some of the princes of France, and gave its name to one of the fairest of the French provinces, from which the heir-apparent of the French throne came to be styled the dauphin. It is not easy to account for the high regard in which the D. was anciently held; nor is it altogether easy to explain the very general transference of its name in modern times to the coryphene, a very different creature, remarkable for those changes of color in its dying moments which poets have delighted to celebrate.

Of the other species of D. one only occurs, and that but rarely, in the British seas, the bottle-nosed D. (*D. tursio*), which is said sometimes to attain a length of 24 feet. It appears to belong to the northern parts of the world.

Dolphins not unfrequently enter the mouths of rivers. A D. of the Arctic ocean (*D. leucas*) ascends into the fresh water of the Obi, to prey upon the ascending fishes of various kinds.

DOLPHIN, Black, *Aphis fabæ*, a species of *aphis* (q.v.), or plant-louse, which infests the bean, and often does considerable injury to crops, sucking the juices of the plants and preventing the development of flower-buds. It is of a dull, black, or dark-green color, the young spotted with silvery white. The first that appear are all wingless, but by and by winged individuals are produced, and the pest spreads with great rapidity. It is in the succulent tops of the plants that the aphides first appear, and a common practice of gardeners is to remove the tops in which they are observed.

DOM, or Don (from Lat. *dominus*, lord). This title was originally assumed by the popes, from whom it descended, in France at least, to bishops and other dignitaries, and finally to monks. In Portugal, the title *dom* is confined to the sovereign and his family. The Spanish *don* was originally confined to the nobility, but is now bestowed by courtesy as indiscriminately as the English *Mr.* or *gentleman*. The feminine *doña* is, in like manner, given to ladies.

DOMAIN. See Demesne, *ante*.

DOMAT, or DAUMAT, Jean, 1625-96; a French writer, known chiefly from his elaborate digest entitled *Lois Civiles dans leur Ordre Naturel Suivies du Droit Publique*, for which Louis XIV. settled upon him a pension of 2,000 livres. The work was published in English in 1722, and has passed through several editions.

DOM-BOC, or Doom-book (book of dooms or sentences, *liber judicialis*), the code of laws compiled by king Alfred, chiefly from the west-Saxon collection of his own ancestor Ina, but comprising also many portions of the Kentish collection of Ethelbert, with the supplements of his successors, and of the Mercian laws of Offa. "Ina's collection," says Dr. Pauli, "was the only one received entire into the Codex, which was chiefly applicable to the condition of the west Saxons. A few articles were admitted here and there from the Kentish and Mercian laws, but research into this matter is not possible, as Offa's book is lost." Alfred made few if any original laws, but contented himself with restoring, renovating, and improving those which he found already in existence. The west-Saxon dialect had become a written language earlier than any of the Teutonic dialects of the continent; and as the power of the clergy in Saxon England

was of a more limited kind than elsewhere, the laws of England, up to the period of the Norman conquest, were administered in the vernacular speech of the people. Alfred's peculiarly Christian character is strongly impressed on his code, which begins with extracts from the Bible, "The Lord spake all these words, saying, I am the Lord thy God." Then follow the ten commandments, the part of the Mosaic law relating to criminal offenses, and passages from the New Testament, including the golden rule. Yet it should be observed, that these extracts prove not the *ecclesiastical*, but only the *scriptural* character of the *dom-boc*. The code was ratified by the Witan, as Alfred expressly informs us. In addition to Dr. Pauli's life of Alfred, now published in two English translations, the reader is referred, for information on this subject, to Thorpe's Introduction to Alfred's Laws, in the *Ancient Laws and Institutes of England*, i. p. 58.

DOMBROW'SKI (properly DĄBROWSKI), JAN HENRYK, a distinguished Polish gen., was b. 29th Aug., 1755, at Pierszowice, in the district of Cracow. He entered the service of the elector of Saxony in 1770; but in 1792, on the first symptoms of the insurrection in Poland, proceeded to Warsaw. He took part in the Polish campaigns against Russia and Prussia, and exhibited such remarkable military talent, that on the termination of hostilities, Suwarrow offered him employment in the Russian service, and Prussia made him a similar offer. Both were refused, and D. went to France, where, in 1796, he was commissioned by the directory to form a Polish legion among his exiled countrymen, of which he was appointed commander. The legion brilliantly distinguished itself in the Italian campaign. While in Rome, the admirable discipline which D. preserved among his troops, raised him so high in the estimation of the senate, that it presented him with the standards which his great countryman Sobieski had taken from the Turks, when he compelled them to raise the siege of Vienna, and which he had sent to the church of San Loretto. In the campaign of 1799–1800, D. gave splendid proofs of his courage. After the peace of Amiens, D. became a gen. of division in the service of the Cisalpine republic; and after the battle of Jena, along with Wybicki, he was ordered by Napoleon (1806) to summon his countrymen to arms. His entrance into Warsaw, at the head of 12 Polish divisions, resembled a classical "triumph." At Dirschau and Friedland, he won fresh laurels. In the fatal Russian campaign of 1812, he commanded one of the three divisions of the fifth *corps d'armée*, and at the passage of the Beresina, saved from destruction the relics of Poniatowski's corps. In 1813, at the head of his Poles, he took an honorable part in the battles of Teltow, Grossbeeren, Jüterbogk, and Leipsic. After the fall of Napoleon, D. returned to Poland, and in 1815 was appointed by the emperor Alexander a gen. of cavalry and Polish senator; but in the following year he withdrew from public employment to his estate in the duchy of Posen. He died 6th June, 1818.

DOME (Ital. *duomo*). Though often used synonymously with cupola (q.v.), a dome, in the stricter sense which it has obtained in the languages of northern Europe, signifies the external part of the spherical or polygonal roof, of which the cupola (*cupo*, or cup) is the internal part. In Italian usage, however, it has a wider signification than even the first, being used to denote the cathedral or chief church of a town, *the house* (domus) *par excellence*, or house of God. The cause of the name of the building being thus applied to the form of the roof which covered it, arose from the fact, that the chief churches of Italy were at one period almost universally so roofed. In tracing the historical origin of the D., we are usually in the habit of regarding it as originating with the architecture of the eastern empire, because it was at Constantinople and in the Byzantine provinces that it was first employed in ecclesiastical structures. But it was the Romans who, in reality, were the inventors of the D., as of all the other applications of the semicircular arch. Of their success in applying it to large buildings, we have abundant proof in the ancient domes still to be seen in Rome and its neighborhood. The D. of the Pantheon is still probably the most magnificent D. in existence, and others of smaller size are to be seen in the temples of Bacchus, Vesta, Romulus, Hercules, etc. "From Rome it went to Constantinople, and from the same source, also, came the few insignificant attempts at domes in the western empire."—Fergusson's *Handbook of Architecture*, ii. 943. The external form of the D. of the church of St. Sophia at Constantinople, which became the typical Christian structure of the kind, will be seen in the illustration appended to BYZANTINE ARCHITECTURE. See PANTHEON. The D. of San Vitale, at Ravenna (q.v.), is said to be still more ancient than that of San Sophia, and is a very remarkable structure of the same class. On the church of St. Marco, at Venice, there are no less than five domes, the center one, as is usual, being much larger than the others. The interior of these domes is covered with mosaic (q.v.). So far from being peculiar to the few churches we have mentioned, domes occur in the churches of almost every town along the western shore of the Adriatic, and form, in fact, the chief architectural feature of this side of Italy. The construction of domes in modern times was revived in Rome, by the building of that of Our Lady of Loretto in 1507. But the three most celebrated modern domes are those of St. Peter's (q.v.) at Rome, of St. Paul's (q.v.) in London, and of the Pantheon (q.v.) in Paris. A very complete article on domes, which has been condensed in the *Penny Cyclopædia*, will be found in the *Encyclopédie Méthodique*, under "Architecture."

DOMENICHI'NO, or **DOMENI'CO**, ZAMPIERI, a celebrated painter of the Bolognese school, was b. in Bologna, 1581. He began his studies under D. Calvaert, and completed them under the Caracci. During the whole of his career, D. had much to suffer from the jealousy of rivals, who are not free from the suspicion of having caused his death by poison, 1641. His frescos are distinguished by correctness of design, soft delicacy, and freshness of color; the heads of his figures, in particular, are remarkable for expressive force. The masterpiece of D., the "Communion of St. Jerome" (in the Vatican), though suggested by Ag. Caracci's, is a sublime production. The "Life of the Blessed Virgin," and the "Cure of the Demoniac Boy," are of exquisite beauty. Out of Italy, the museum of the Louvre possesses the largest number of D.'s works.

DOMESDAY BOOK, or DOOMSDAY BOOK, the name of one of the oldest and most valuable records of England, containing the results of a statistical survey of that country made by William the conqueror, and completed in the year 1086. The origin of the name—which seems to have been given to other records of the same kind—is somewhat uncertain; but it has obvious reference to the supreme authority of the book in doom or judgment on the matters contained in it. It was anciently known by several other names, such as the *Liber de Wintonia*, or Book of Winchester; and the *Rotulus Wintonia*, or Roll of Winchester, because it was at one time preserved in the royal treasury in that city; the *Liber Regis*, or the King's Book; the *Scriptura Thesauri Regis*, or Record of the King's Treasury (where it was long kept, together with the king's seal, under three locks and keys); the *Liber Censualis Angliæ*, or Rate-book of England.

The way in which the survey was made will be best described in the words of the contemporary writer in the *Anglo-Saxon Chronicle*. After relating how, in the year 1085, England was threatened with invasion from Denmark and Flanders, and how king William prepared for its defense by laying waste the sea-shores, and by raising the largest army that had ever been seen in the island, "billeting the soldiers upon his subjects, every man according to the land which he possessed," the annalist goes on to say that at midwinter, when the king was at Gloucester, "he had a great consultation, and spoke very deeply with his witan [i.e., great council or parliament] concerning this land, how it was held, and what were its tenantry. He then sent his men all over England, into every shire, and caused them to ascertain how many hundred hydes of land it contained, and what lands the king had in it, what cattle there were in the several counties, and how much revenue he ought to get yearly from each. He also caused them to write down how much land belonged to his archbishops, to his bishops, his abbots, and his earls, and—that I may be brief—what property every inhabitant of all England possessed in land or in cattle, and how much money this was worth. So very straitly did he cause the survey to be made, that there was not a single hyde, nor a yardland of ground, nor—it is shameful to say what he thought no shame to do—was there an ox, or a cow, or a pig passed by, and that was not set down in the accounts, and then all these writings were brought to him."

The survey was made by commissioners called the king's justiciaries, who seem to have had the help of the chief men of every shire. By a sworn assize or jury of the sheriffs, lords of manors, presbyters of churches, reeves [i.e., grieves or overseers] of hundreds, bailiffs, and six villeins [i.e., tenants at will] of every village, they made inquest as to the name of the place; who held it in the time of king Edward (1041–66); who was its present possessor; how many hydes there were in the manor; how many homagers or vassals; how many villeins; how many cottars; how many serfs; what plowgates in demesne [i.e., reserved in the lord's own hand]; how many freemen; how many tenants in socage [i.e., tenants by hereditary right]; how much wood; how much meadow and pasture; what mills and fish-ponds; how much had been added or taken away; what was the gross value in king Edward's time; what was the present value; and how much each free-man or soc-man has or had. Of all this there was to be a threefold return or valuation: 1. As the land was held in king Edward's days; 2. As it had been given by king William; 3. As it stood at the time when the survey was made; and the jurors were to say further whether the value could now be raised.

The returns thus gathered in the several shires, and their hundreds and other subdivisions, were arranged and digested in the record which is now called the Great or Exchequer Domesday. The enumeration of the cattle and swine, which so moved the indignation of the Anglo-Saxon chronicler, was omitted from the record, doubtless because the live-stock was altering every month and year, so that an account of its numbers in any one year could not be of permanent importance; but that the enumeration was made, is proved by the records called Little Domesday and the Exon Domesday. These are believed to be transcripts of the original rolls or returns made by the conqueror's commissioners for the counties of Essex, Norfolk, Suffolk, Wilts, Dorset, Somerset, Devon, and Cornwall; and they set forth the number of horses, oxen, sheep, goats, and pigs, together with some other details left out in the compilation of the Great Domesday. The taxes were levied according to the divisions of the country given in the D. B., until 1522, when a new survey, popularly called the *New D. B.*, was made.

The mere statement which has been made of its contents, is enough to show the immense value of D. B. for all purposes of inquiry into the ancient condition of England. "It will ever," says Dr. Lappenberg, "be found an inexhaustible source

of information respecting the Anglo-Saxon and Norman constitutions, particularly the rights and revenues of the kings and their vassals, the relations of cities and towns, statistic accounts of various kinds, families and their landed members, together with innumerable matters highly interesting to inquiring posterity, but unnoticed by the chroniclers of those times, either as too well known or as worthless. An intimate acquaintance with Domesday should supply the basis of every historical account of England, particularly of its special history during the middle age." No other country of Europe can show such a work. It was fit, therefore, that it should have been the first great English record published at the national cost. It appeared in 1783 in two folios, being printed with types cast for the purpose, so as to represent the contractions of the original manuscript, and having been ten years in passing through the press. In 1816, two supplementary volumes were published, the one containing an excellent general introduction, by sir Henry Ellis of the British museum, with indices of the names of places and of the tenants in chief mentioned in the work; the other containing four other records of the same nature: 1. The Exon Domesday, already mentioned; 2. The Inquisitio Eliensis, a record closely resembling the Exeter Domesday, containing the survey of the lands of the monastery of Ely, in the counties of Cambridge, Hertford, Essex, Norfolk, Suffolk, and Huntingdon; 3. The Winton Domesday, containing two surveys of the city of Winchester, one made between 1107 and 1128, the other in 1148; and, 4. The Boldon Book, a survey of the possessions of the see of Durham, made in 1183. This last work is especially valuable, as partially supplying a deficiency in the survey for D. B., which did not extend to the counties of Durham, Northumberland, Westmoreland, and Cumberland, either, it would seem, because they had been lately laid waste by the conqueror, or because his dominion was not fully established in them. A new and better edition of the Boldon Book was issued in 1852 by the Surtees society, which, in 1857, printed *Bishop Hatfield's Survey*, another record of the possessions of the see of Durham, compiled between 1345 and 1381. A new and enlarged edition of sir Henry Ellis's *General Introduction to Domesday Book*, was published in 1833, in 2 vols. 8vo. See also Stubb's *Select Charters*, and Freeman's *Norman Conquest* (vol. v., 1876). In 1861, a fac-simile copy of that part of D. B. which relates to Cornwall, was published by the ordnance survey, as an example of what can be done by the new process of engraving called photozincography. This experiment proving successful, government has gone on publishing the rest of the D. B., county by county, in the same way. In 1872, government ordered a general return of owners of lands, to be prepared by the local government board. This new "Domesday Book" was published in 1874–76.

DOMESTIC ANIMALS are those which, in order to turn them to his use, man has tamed or reduced in a greater or less measure from their natural wildness, and which he makes the objects of his care, and in a living state his property. Many animals are useful to man, which he has never thus appropriated. Such are the deer and other game which the hunter pursues, and fishes generally, whether of the sea, lake, or river. Man has not yet found it possible to domesticate them, or has not found it necessary or desirable to do so. Individuals, indeed, of some species may have been domesticated, and become very tame, but these are exceptional instances. In general, those only are called domestic animals which have existed from one generation to another in a state of domestication. Of almost all of them, domesticated races exist, considerably different from any that are now found in a state of nature; the peculiar circumstances in which they are placed by domestication exercising a modifying influence, like that of cultivation in plants. Domestic animals mostly belong to the classes of mammals and birds. Of mammals, those which have been domesticated are exclusively of the common quadruped form, and mostly herbivorous. The greatest number, and these among the most important, belong to the order of ruminants; some of them being valuable for their flesh, their milk, their hair or wool, their hide, etc., or as beasts of burden and of draught, some even on all these accounts. To this order belong the ox, buffalo, and yak, the sheep, the goat, the reindeer, the camel, and the llama and alpaca. Of other herbivorous quadrupeds, the most important are the horse and ass, the elephant and the hog. Of the elephant, however, although for many ages it has been much employed for various purposes in India, no domesticated race exists; the individuals which man reduces to his service being still taken as at first from among the wild denizens of the forest. Domesticated races exist of two comparatively unimportant quadrupeds of the order of rodents, the rabbit and the cavy or Guinea-pig.—Of carnivorous quadrupeds, there are only two which have been generally and thoroughly domesticated, the dog and the cat. The uses to which these animals are destined are very different from those in order to which herbivorous quadrupeds are kept in a domestic state. Analogous to one of the uses of the dog is that to which the cheetah or hunting-leopard is applied by some of the princes of India, but, like the elephant, it is only individually domesticated. The same remark may be made concerning some other animals—the otter, the civet, etc.—which in different countries are tamed or kept in confinement to meet certain purposes for which man finds it convenient to employ them. The domestication of the ferret is rather more complete.—Of birds, the most important domestic species belong to the gallinaceous order, and to the family *anatidæ* among web-footed birds. To the former belong the common domestic fowl, the turkey, the

peacock, the Guinea-fowl, etc.; to the latter, the goose, duck, etc Of other birds, none can be said to be truly domesticated, except, perhaps, one or two species of song-birds, particularly the canary. The birds used in falconry are domesticated only in the same sense as the cheetah; but it is not uninteresting to observe that man has been able to make both birds and beasts of prey his servants.—Reptiles are quite capable of being tamed, and in some countries some of them are occasionally kept in houses for killing flies, or even for killing mice and rats; but none of them can be enumerated among domestic animals. Nor, perhaps, can any species of fish be so regarded, although artificial ponds have long been in use, and some species of fresh-water fish are to a certain extent the objects of care and of a kind of culture on the part of man.—In the lower divisions of the animal kingdom, only a few species ever receive such culture, or in their living state are claimed by man as his property. All these belong to the class of insects—viz., two or three species of bee, two or three species of silk-worm moth, and two or three species of cochineal insect. These may perhaps more fitly be described as *cultivated* than as *domesticated*.

Many animals not yet domesticated might probably be added with advantage to the number of domestic animals. Adaptation to particular climates and situations might probably be found to recommend species allied to those in which great part of the wealth of mankind has long consisted, and from which still more of it has been derived. It is not impossible, also, that as the waste places of the world become peopled, animals already becoming scarce may be advantageously domesticated on account of their fur or other products for which they are now pursued by the hunter.—The principal domestic animals, however, of the present day have been domestic animals, and highly valued as such, from time immemorial. We have no record of the domestication of the ox, the horse, the camel, the dog, etc. Even the llama and alpaca, although known only to the inhabitants of the Andes and adjacent regions, were found in a state of domestication there when South America was first visited by Europeans, and their subjection to man is probably to be referred to the earliest periods of Peruvian civilization. The limitation of some domestic animals to particular countries and climates—of which we have notable instances in the camel of the Asiatic deserts, the reindeer of the arctic regions, the yak of the steep and snow-clad Himalaya, the buffalo of tropical marshes, and the South American quadrupeds just mentioned—forbid us to suppose that all the important domestic animals were domesticated by the same people and at the same period, or that they have all spread in a state of domestication from a common center or source. Yet there are many circumstances which point to the same Asiatic region as that in which the greater number of them were first domesticated, which is commonly regarded as the cradle of the arts and sciences, and even of the human race.

DOMESTIC ARCHITECTURE. The external forms and internal arrangements of the domestic abodes of a people are far more influenced by their manners, habits, and occupations, and by the climate in which they live, than their ecclesiastical edifices and public buildings; and there is, consequently, no department of architecture which is so varied and national as domestic architecture. But not only are the circumstances of each country different in this respect—the same is the case with every department of each country, with every town in each department, with every street in each town; and a D. A. which fulfills its object, will not only adapt itself to the necessities, but will make the best, in point of artistic effect, of the specialties of every case with which it is called upon to deal. The circumstances of families, and even the tastes and fancies of individuals, are legitimate subjects of consideration in domestic architecture. To attempt to give to D. A. the beauty of uniformity, is consequently to mistake both its object and the source from which its charm is derived. When attained at all, uniformity is attained not in accordance with, but in defiance of, the utilitarian objects of domestic architecture. The results of this artistic falsehood may be seen in the monotonous and meaningless streets and squares that have been built in all our principal towns during the last eighty years. The legitimate charm of D. A., because the only one which can arise from the complete fulfillment of its object, is the charm of variety. It is the charm which our ancestors sought during the whole of the great architectural period of the middle ages, and which our architects, who in this, as in so many other respects, are returning to their principles, are now beginning to cultivate. But here, as in all similar cases, it must be borne in mind that, in general, it is the principle alone that can be revived, and that the details by which it was carried out can be legitimately copied only in the exceptional cases in which circumstances and the objects to be attained remain unchanged. The position of an Englishman in the 19th differs in many respects from that of an Englishman in the 14th c.; and to construct for the former a house in all respects resembling that which was constructed for the latter, would be to commit an error the same in kind as if we had sought for either of them a model dwelling in Pompeii or Canton.

An account of the forms of English houses from the 12th c. downwards, will be found in Parker's *Glossary of Architecture*. Apart from our own earlier examples, the forms of D.A. most suggestive for present use in this country, are those which are to be found in such wonderful beauty and variety in almost all of the older continental towns of the n. of Europe. It was from the D. A. of France and the Netherlands that that of Scotland, at

its best period, was mainly borrowed; and if we wish to improve it now, we can scarcely do better than revert to its original source.

DOMESTIC MANAGEMENT, financially considered, may be defined as the art of making a given income go the furthest possible in procuring for a family the means of living—the word living being understood in its wider and higher sense. It being assumed, as a fundamental maxim, that the outlay shall be within the income, the leading object of the art is rightly to apportion the outlay among the different requisites. How this is best to be done, can be discovered only by large experience; and if a young housekeeper were to begin her career without some indications of the path she should follow, she must fall into serious mistakes, occasioning loss and discomfort. Not that any amount of previous instruction, whether written or oral, can give the skill of experience; but attention to some of the more important maxims may help to avert very serious errors while the lessons of experience are being learned. By way of outline charts for this rather intricate navigation, we give here four schemes of household expenditure, based upon experience, and adapted to some of the more extensive classes of the British community, prefacing the schemes with a few general and miscellaneous observations.

It is a very safe rule, that the best quality of food is the cheapest in the end; "it goes further"—i.e., it gives more nourishment; but those who require to practice economy may, by going to market themselves, purchase good meat at a cheaper rate than they would if they sent for it, from reasons known to experienced buyers, such as the pieces they select not being called prime cuts, not being so well-shaped, etc., which in no way takes from the wholesomeness of the article. Again, good cooking renders things more digestible and nourishing; bad cooking is absolute waste, to say nothing of the injury it does to the stomach. How meat is rendered tender by boiling or broiling, without having its nutritive qualities extracted, is described in the articles BOILING and BROILING. For the time necessary for roasting, baking, stewing, and frying, good instructions are given in the very useful works, *The Dictionary of Daily Wants*, and Mrs. Beeton's *Book of Household Management*, where not only the mode of cooking, but the actual cost of each dish, is given.

Some books on housekeeping recommend that coal should be bought when cheap, and that groceries should be purchased in large quantities; but this is open to objections, that coal occupies a larger space than can be spared in small houses; that many articles of grocery waste in quantity or deteriorate in quality by keeping, as sugar, which loses weight, and tea, which loses aroma; and that both coal and grocery in masses, are apt to be wasted by servants, children, and thoughtless persons, from the circumstance of having large quantities to go to. Groceries may be *bought* cheaper in this way, and it is only personal experience that can decide in every case as to their being *really* cheaper. Candles and soap are the chief things that certainly improve by keeping. Candles should be hung up, if dips, but molds should be stored in boxes, and covered and kept in a dry place. Soap bought in bars, in as dry a state as possible, should be cut in lumps, six to the bar, and laid on shelves, to harden slowly.

A thorough knowledge of the art of choosing material for clothing, and making and cleaning articles of apparel, is also highly necessary, and, like good marketing for food, can only be acquired by practice. Many things must be considered in this kind of purchase; the evenness of the threads in cotton and linen fabrics, softness of texture, freedom from what is called "dress." In printed goods, the same rule is to be observed as to evenness of weaving, in addition to which, those kinds should be selected that have the pattern printed through, so as to show on the wrong side, and of a lilac or dark-blue color, as being the best for washing. Flannel goods should be chosen for their regular make, good width, and softness; and flannel articles should be made larger and longer than necessary, to allow for shrinking when washed. Good patterns for making from should be obtained, well-fitting and appropriate dress lasting longer and looking better than what is put together in an inconsiderate, slovenly manner; a clever needlewoman, like a clever cook, is the most truly economical one. The same remarks apply to furniture chintzes and linens for sheetings, etc. Articles chosen for glare and show, without regard to their being in keeping with the general style of the room or house, of a flimsy, irregular, or ill-printed make, must certainly turn out unsatisfactory and wasteful.

The accompanying scales relate to prices in London and other large English towns, and reckoned on the allowance of a loaf and a half of bread (weighing 4 lbs. to the loaf) for each individual. Young children consume less bread than full-grown persons, but they require more milk and sugar; therefore the scale can be equalized according to circumstances. Puddings and vegetable food for the children must also influence the amount for butcher's meat. It is supposed in these scales that the husband dines at home; if he dines in the city, or elsewhere, a reduction must be made in the butcher's, baker's, grocer's, and publican's bills. Half a pound of butter, and half a pound of sugar, are the usual weekly allowances for each person. If the children are too young to be educated, the money allowed in the following scales should be saved till they are older.

SCALE FOR AN INCOME OF £300 PER ANNUM, FOR A FAMILY CONSISTING OF HUSBAND, WIFE, THREE CHILDREN, A GENERAL SERVANT, AND OCCASIONAL ASSISTANT.

	£	s.	d.
Rent, taxes, water, and gas	45	0	0
Wages for servant and charwoman	14	0	0
Butcher meat, at 16s. weekly	41	12	0
Baker, 9 loaves at 8½d.; flour, 1s.	19	3	6
Grocer (tea, 1s. 6d.; parlor sugar, 7d.; children's and servant's, 1s. 8d.; parlor butter, 1s. 6d.; children's, 9d.; servant's, 8d.; spices, 4d.; cheese, 1s. 4d.; bacon, 1s. 2d.; rice, eggs, and pudding materials, 1s. 6d.), 11s. weekly	28	12	0
Vegetables and fruit	8	0	0
Milk, 3s. 6d. weekly	9	2	0
Beer for parlor and servant, 4s. weekly	10	8	0
Fuel	15	0	0
Washing (all done at home), soap, soda, mangling	4	10	0
Clothing for five persons	38	0	0
Church and charities	3	0	0
Library and books	2	0	0
Fire insurance on £300	0	6	0
Insurance on life	8	0	0
Education	20	0	0
Replenishing furniture, crockery, glass, etc	5	14	0
Traveling (change of air)	10	0	0
Doctor	5	5	0
Income-tax, at 4d. per pound	5	0	0
Omnibus, postage, and sundries	7	7	6
	£300	0	0

SCALE FOR AN INCOME OF £200 PER ANNUM, FOR A FAMILY CONSISTING OF HUSBAND, WIFE, THREE CHILDREN, AND A SERVANT.

	£	s.	d.
Rent and taxes, etc	32	0	0
Wages	5	0	0
Butcher, at 12s. weekly	31	4	0
Baker (9 loaves at 8½d.; flour, 9d.), 7s. 1½d. weekly	18	10	6
Grocer, 8s. weekly	20	16	0
Milk, 2s. 4d. weekly	6	1	4
Beer, 1s. 6d. weekly	3	18	0
Vegetables and fruit	6	10	0
Fuel	10	0	0
Washing (soap, starch, soda, etc.)	3	10	0
Clothing	17	10	0
Church and charities	1	10	0
Library and newspaper	1	10	0
Fire insurance	0	4	0
Insurance on life	6	0	0
Income-tax, at 4d. per pound	2	0	0
Education	12	10	0
Doctor	3	3	0
Replenishing	4	10	0
Traveling to sea-side	5	0	0
Omnibus, postage, sundries	8	13	2
	£200	0	0

SCALE FOR AN INCOME OF £100 PER ANNUM, FOR A FAMILY CONSISTING OF HUSBAND, WIFE, AND THREE CHILDREN.

[Rooms only should be rented, unless a lodger could be found, who would help to pay the rent of a cottage.]

	£	s.	d.
Rent, 5s. weekly	13	0	0
Butcher, 6s. weekly	15	12	0
Baker (7½ loaves at 7d.; flour, 8d.), weekly, 5s. 0½d.	13	2	2
Grocer, 4s. weekly	10	8	0
Milk, 1s. weekly	2	12	0
Vegetables, 1s. 8d. weekly	4	6	8
Beer (occasional)	1	6	6
Fuel	7	0	0
Carried forward,	£67	7	4

	£	s.	d.
Brought forward,	67	7	4
Washing (soap, starch, etc.)	2	0	0
Clothing	12	12	0
Doctor, or sick fund	3	0	0
Education	6	0	0
Life insurance	2	0	0
Fire insurance	0	2	0
Charities	0	5	6
Holiday excursions	1	10	0
Replenishing household goods	1	5	4
Books, papers, and periodicals	1	0	0
Postage and sundries	2	7	10
	£100	0	0

SCALE FOR AN INCOME OF £52 PER ANNUM, FOR A FAMILY CONSISTING OF HUSBAND, WIFE, AND THREE CHILDREN.

	£	s.	d.
Rent of rooms, 3s. 6d. weekly	9	2	0
Baker (7½ loaves at 7d.; flour, 8d.), 5s. 0½d. weekly	13	2	2
Butcher, 1s. 6d. weekly	3	18	0
Milk, 7d. weekly	1	10	4
Tea (quarter lb. at 3s.), 9d. weekly	1	19	0
Sugar (1½ lbs. at 4d.), 6d. weekly	1	6	0
Rice, treacle, and pearl-barley	1	6	0
Butter (½ lb. at 1s. 6d.; dripping, 1 lb. at 3d.), 1s. weekly	2	12	0
Candles, average 6d. weekly	1	6	0
Mustard, salt, and spice	0	4	0
Vegetables, 1s. 6d. weekly	3	18	0
Coal and wood, 1s. 3d. weekly	3	5	0
Soap and soda	1	10	0
Schooling, 3d. weekly	0	13	0
Clothing fund	3	16	6
Sick fund	0	10	0
Holiday excursions	1	0	0
Postage, books, and sundries	1	2	0
	£52	0	0

[This income could be improved by having lodgers, who would help to pay the rent, and also if a plot of kitchen-garden ground could be obtained. Since the above scales were prepared, the price of butcher meat, butter, and sundry other articles has risen considerably. This must therefore be considered.]

DOMICILE, a man's legal place of abode, or the place which the law will hold to be his residence. In determining questions of domicile, so often surrounded by difficulties, the law endeavors to follow the facts of each case, and, consequently, the legal as well as the natural view of the matter is expressed in that definition of a domicile in the code which says, "every man has his domicile where he has placed his hearth and centered his fortunes, whence he goes not forth without an occasion, from which, when he is absent, he is said to be abroad, and to which, when he returns, he is said to cease to be abroad."—Cod. 10, tit. 40, s. 7. Even in Rome, questions of domicile were not without importance, for the empire was divided for purposes of domestic government, and the inhabitant of one province was not subject to the magistrates of another. But it was in modern times, when Europe was divided into many independent kingdoms, and America was formed out of states having different local customs and laws, that the law of domicile assumed its full importance. It now constitutes one of the most difficult branches of private international law (q.v.). The following are its most general rules: 1. The place of birth is the original domicile of every one, provided that, at the time of his birth, it was the domicile of his parents; but if his parents were then on a visit or a journey; the home of the parents will be the domicile of birth, nativity, or origin (*domicilium originis*). 2. If the child is illegitimate, it follows the domicile of its mother. 3. The domicile originally obtained continues till a new one is acquired; unless it be lost by non-residence, under the provisions of a statute, as is the case with paupers, for the purposes of parish relief in Scotland. 4. Minors are generally deemed incapable of changing their domicile of their own accord, but it may be changed by a change in the domicile of the parents, which it follows. 5. If the father dies, his last domicile is that of his widow and children. 6. A wife follows the domicile of her husband. 7. The place where a man lives, if there be no ground for entertaining an opposite presumption, is his domicile. 8. If a person of full age, having a right to change his domicile, takes up his abode in a new place, with the acknowledged intention of remaining permanently fixed there (*animo manendi*), that place immediately

becomes, and that which he has quitted ceases to be, his domicile. Questions as to what amounts to intention, or what circumstances constitute sufficient proof of intention of remaining, or quitting a place of residence, are amongst the most difficult in the law of domicile. Most persons who are resident abroad have a sort of floating notion that, in certain conceivable circumstances, they would return to their native country, and to these vague feelings they give expression in a manner more or less vague. One of the most important effects of the law of domicile was as to the validity of the will which a deceased person leaves—the English rule being, that it must be according to the law of the domicile, wherever the will was made, though the law of Scotland allowed a will also to be good if it was executed according to the law of the country where it was made. A statute, however, was passed in 1861, to make the law uniform, so that the will of a British subject, as regards personal estate, made out of the United Kingdom, is deemed valid, wherever his domicile may be, if the will is conformable to the law of the country where made, or to the law of the domicile of origin. And by a later statute in 1868, even as regards real or heritable estate, an English will is to have effect given to it as regards property situated in Scotland. It is impossible, in our limits, to enumerate other effects of the law of domicile. Generally, it may be stated that it regulates the succession to personal or movable property, which is said to follow the person, and must be distributed after death according to the law of the country of which the deceased died a domiciled citizen. Heritable or real property, again, descends in accordance with the law of the land in which it is situated (*lex rei sitæ*). As to the effect of a domicile of citation in Scotland in actions of divorce, see DIVORCE, MARRIAGE.

DOMINANT, in music, the fifth above the tonic: the ruling or governing tone of the key. Ancient writers called the D. the *quinta toni*, from its being the next in importance to the tonic. The D. chord is always a major chord, the third being the *subsemitonium modi*, or leading note, which always rises a semitone to the tonic. The D. seventh is the major chord with the flat seventh above the D., and is the same in major and minor keys. The rules for the treatment of the D. seventh, and for the chord of the ninth on the D., apply to all other chords of the seventh or ninth, which arise from the other degrees of the scale. The D. seventh is a most important chord in modulation. The resolution of the D. seventh is always into the chord of the tonic, when not interrupted. The D. as a key is the nearest in relation to the tonic. Modulation into the key of the D. is so frequent in composition, that its form may be said to be stereotyped. The subdominant, or under-dominant, stands next in importance to the D., and has its place on the fourth above the tonic, or, which is the same, on the fifth below. The chord of the subdominant is major or minor, according to the mode of the key. The chords on all other degrees of the scale being either minor or diminished, give greater importance to the major chords of the tonic, D., and subdominant, in which chords all the notes of the scale are found, while the combination of these chords, giving the most perfect impression of a key, may account for their being of such importance in harmony.

DOMINANT TENEMENT. See SERVITUDE.

DOMINGO, SAN or SANTO, a maritime city of Hayti, capital of a province of the same name, and of the republic of San Domingo or the Dominican republic, stands on the s.e. coast, at the mouth of the Ozama, in lat. 18° 29′ n., and long. 69° 57′ west. It is the oldest settlement of European origin in America, having been founded in 1494 by Bartolommeo Columbus. The pop. numbers about 10,000; and the principal buildings are churches, including a cathedral, convents, hospitals, colleges, barracks, an arsenal, and a light-house. The town is surrounded by a wall 8 ft. thick and 10 ft. high, built of *mamposteria*, a composition of earth, powdered stone, and lime. The streets are broad, and intersecting at right angles. The chief trade is in timber and dye-woods. The name S. D. is sometimes applied to the whole island of Hayti. See HAYTI and DOMINICAN REPUBLIC.

DOMINIC, SAINT. See DOMINICANS.

DOMINICA, or DOMINIQUE, a British West India island, lies in lat. 15° 18′ n., and long. 61° 24′ w., containing about 290 sq.m., and (1870) 28,517 inhabitants. It is of volcanic origin, hot and sulphureous springs still attesting the fact. It is the loftiest of the Lesser Antilles, attaining, at one point, an elevation of 5,314 ft., and nearly one half of the surface consists of precipitous mountains and deep ravines. Where capable of cultivation, the soil is fertile; and, even on apparently inaccessible sites, the emancipated negroes have successfully established provision grounds. The principal productions are sugar, coffee, cocoa, cotton, lime-juice, molasses, rum, tamarinds, sulphur, indigo, rose-wood, and other cabinet woods. In 1856, the exports were £79,755; in 1866, £106,452; in 1875, £71,621. The imports in the same years were respectively £64,124, £62,188, and £62,310. In 1860, the tonnage entered and cleared was 18,777 tons; in 1865, 16,176; and in 1875, 24,748. In 1875, again, the revenue was £21,682, and the expenditure was £21,793; while in 1849, the returns had given £8,877 and £10,539. The public debt in 1878 was £8,000. The legislation of 1857 appropriated £700 for the purpose of affording aid, under statutory regulations, to schools of every denomination—a liberality which, while

accepted by Protestants, whether of the church of England or of dissenting bodies, does not appear to have been appreciated by the Roman Catholic priesthood. The abolition of slavery, independently of inferences to be drawn from correlative statistics, is admitted by all parties to have worked well in Dominica. In 1839, the planters at a public meeting acknowledged, "with feelings of unmixed gratification, the peaceable and quiet disposition evinced by the laborers, as a body, since their entire emancipation;" and, in 1852, the lieutenant-governor officially adverted to the prosperity and contentment of the same class. It is even said that most of the 20 members of assembly are men of color. The temperature, according to season and altitude, ranges from 88° F. down to chilliness; and even in the dry months, from Feb. to Aug., rain frequently falls. D. was discovered by Columbus, on his second voyage, in 1493, on a Sunday (whence its name Dominica, i.e., the Lord's day), being then thinly inhabited by Caribs. From the commencement of the 17th c. to the middle of the 18th, it may be described as having been a neutral island; but in 1759, it was captured by England, and permanently ceded by France in 1763. In 1802, it again came into the possession of France, but was finally handed over to England in 1814.

DOMINICAL LETTER, or SUNDAY LETTER, is one of the seven letters A, B, C, D, E, F, G, used in almanacs, etc., to mark the Sundays throughout the year. The first seven days of the year being marked in their order by the above letters in their order, then the following seven, and all consecutive sets of seven days to the end of the year, are similarly marked; so that the 1st, 8th, 15th, 22d, etc., days of the year are all marked by A; and the 2d, 9th, 16th, 23d, etc., by B; and so on. The days being thus marked, it is evident that on whatever day the first Sunday of the year falls, the letter which marks it will mark all the other Sundays in the year, as the number of the letters and of the days in the week is the same.

As the common year consists of 52 weeks and one day over, the dominical letters go backwards one day every common year. If the D. L. of a common year be G, F will be the D. L. for the next year. As a leap-year consists of 52 weeks and two days, the letters go backwards two days every leap-year. If in the beginning of a leap-year the D. L. be G, E will be the D. L. for the next year. This extraordinary retrocession, however, is made to take place at the intercalary day (the 29th Feb.) by the artifice of marking it by the same letter as the day preceding it, and thus the next Sunday is marked by the letter preceding that which marked the Sundays before the intercalary day. Suppose the 28th Feb. in a leap-year to be a Sunday, and marked by F, it is evident that the D. L. for the rest of the year will be E. As every fourth year is a leap-year, and the letters are seven in number, it is clear that the same order of letters must return in four times seven, or 28 years, which would, but for the leap-years, recur in seven years, and hence the solar cycle (see PERIOD). The dominical letters were first introduced into the calendar by the early Christians, to displace the nudinal letters in the Roman calendar. They are of use as a means of discovering on what day of the week any day of the month falls in a given year. See EASTER. Rules and tables for finding them are given in prayer-books, breviaries, etc., as well as in works on dates. See DATE.

DOMINICAN REPUBLIC, a state formed of the Spanish or e. section of Hayti (q.v.). Spain, in 1697, surrendered to France, by the treaty of Ryswick, the w. part of the island, retaining the remainder down to 1795. In the year last mentioned, however, the Spanish portion became nominally French. In 1814—the west having vindicated its independence—France formally relinquished, in favor of Spain, all claim to the east. In 1822, the colony, in imitation of the continental possessions, threw off the yoke of the mother-country, to link itself, more or less closely, with its African neighbors. But in or about 1843, it assumed a separate standing as the Dominican Republic, the anarchy of which it exchanged in 1861 for the despotism of its former masters. But in 1863, it again revolted, and Spain gave up the possession, and the republic has since maintained a troubled existence. The D. R. has an area of 18,000 sq.m., nearly two thirds of the area of the whole island. Its principal productions are sugar, tobacco, and coffee. Its pop., chiefly negroes and mulattoes, is estimated at 250,000. The capital, San Domingo, contains 15,000 inhabitants.

DOMINICANS, an order of preaching friars in the Roman Catholic church (*fratres prædicatores*), founded at Toulouse in 1215 by Dominic (Domingo) de Guzman. Dominic was born at Calahorra, in Old Castile, in 1170. He studied theology at Palencia, and in 1199 became canon and archdeacon of Osma in Castile. In 1205, along with his superior, Diego de Azebes, bishop of Osma, he began to itinerate through the s. of France, for the purpose of converting the "heretical" Albigenses; and convinced that the ignorance of the people and the worldliness of the clergy were great helps to the progress of heresy, he instituted the order which bears his name, for the express purpose of preaching and the cure of souls. Dominic, however, found it impossible to convert the Albigenses by this method, and therefore had recourse to another. In 1208, at the instigation of Dominic, the pope proclaimed a crusade against these "heretics;" the barons of France were summoned to take part in it, and headed by De Montfort, committed horrible slaughter on these unfortunate people. The order of the D. was confirmed by Innocent III. and Honorius III. in 1216. The members followed

the rule of St. Augustine, somewhat modified; their dress was a white garment, resembling that of the Carthusians, with a black cloak and pointed cap of the same color. In 1220 they took the vow of poverty. Dominic died at Bologna in 1221, and was canonized by Gregory IX. in 1233. He is said to have been ordinarily not a cruel or unfeeling man, but his religious passions were so vehement, that they entirely dried up the milk of human kindness in his heart, and his conduct towards heretics was merciless in the extreme. As early as 1206, he founded an order of Dominican nuns, which, after 1218, when the first convent was established at Rome, spread far and wide. These nuns followed the same rule as the friars, and were solemnly pledged to habits of industry. A *third* Dominican order (the Knights of Christ) was established in 1224, and confirmed in 1279. It was originally a company of knights and nobles who had leagued themselves together for the suppression of "heresy" by force of arms, but after the death of its founder, the order was changed into that of the *Penitents of St. Dominic*. The members of this branch of the D. were also called the Tertiary Dominicans. They were not bound by any vows, but their special duties were to observe particular fasts and devotions, and to execute great ecclesiastical judgments. They retained all their civic and domestic privileges. There were also *female* Penitents of St. Dominic, a few of whom, however, betook themselves to a conventual life, and became nuns. These few were chiefly in Italy; the most famous was St. Catharine of Siena. The glory of apostolic poverty, which encircled the D., the privileges which they possessed—especially of preaching and hearing confession—and the circumstance that as early as 1230, only 15 years after the foundation of their order, they secured a chair of theology in the great university of Paris, all helped to rapidly increase their numbers and influence. Within *six* years after their establishment, they had spread to England through one Gilbert du Fresney, and founded a monastery at Oxford. "The monks," writes a contemporary annalist, Matthew Paris, himself a Benedictine, "did not, in three or four hundred years, ascend to such a height of greatness as the friars, minors and preachers, within twenty-four years after they began to build their first house in England." Their progress was scarcely less rapid in Scotland, where they found a munificent patron in king Alexander II., who is said to have met St. Dominic at Paris about the year 1217. In Britain, the D. were called the *Black Friars*. In France they received the name of Jacobins, from the Rue St. Jacques (Lat. *Jacobus*) in Paris, where they first established themselves. Their monasteries arose throughout all Christendom, and were even to be seen on the shores of Asia, Africa, and subsequently America. Their monarchical constitution, which bound all the branches and congregations of the order under one grand head (*magister ordinis*), insured their progress and the co-operation of their efforts to secure influence in church and state. Through their preaching and proselytizing, it is undeniable that they exercised, at the time of the foundation of their order, and for a considerable time after, an influence alike extensive and beneficial. They have produced several great scholars and men of genius, such as Albertus Magnus; Thomas Aquinas, the normal theologian of the Roman Catholic church, and Raymund de Pennaforte. They have, however, acquired a black reputation in history in connection with the inquisition (q.v.), in which they were the chief agents. After 1425, when they obtained permission to accept endowments, they in some measure refrained from begging, and engaged themselves more with politics and theology. Their great rivals were the *Franciscans* (q.v.), and the mutual animosity of the two orders was strongly exhibited in the disputes of the Thomists and Scotists. These two orders divided between them the honor of controlling the church, and often the Catholic states of Christendom, until the rise of the Jesuits in the 16th c., who gradually drove both from the schools and the court, when the D. were compelled to return to their original vocation. Their power was, however, again revived to a certain extent in 1620, when the censorship of books was conferred on the master of the Vatican at Rome, who must always be a Dominican. In the 18th c., the order of D. possessed 1000 monasteries and convents, divided into 45 provinces, besides 12 separate congregations or sects. At present, the order flourishes only in Italy, France, Hungary, Switzerland, and America. The Dominican nuns, who are not numerous, have convents in Italy, France, Belgium, Hungary, Bavaria, and America.

DOM'INIS, MARCUS ANTONIUS DE, an ecclesiastic whose career was both singular and checkered. He was b. in 1566 at Arba, on the coast of Dalmatia, and educated, first at Loretto, and subsequently at Padua, where he greatly distinguished himself both by his ability and the varied character of his studies. While at Padua, he taught mathematics, physics, and eloquence. Having completed his theological curriculum, he was, after some time, appointed bishop of Segni, and two years later, archbishop of Spalatro, in which capacity, however, he quarreled with the pope, and having, moreover, exhibited certain Protestant leanings, he found it expedient to resign his post. In 1616, he came to England, where he was hospitably received. King James appointed him dean of Windsor; and while holding this office, he wrote his *De Republica Ecclesiastica*, a work in which he endeavored to show that the pope had no supremacy over other bishops, but was only *primus inter pares*. D. published one or two other productions between 1617 and 1618; but finding Anglicanism far from satisfactory, a revulsion of feeling occurred, and D. once more looked and longed for the unity of the Catholic

church. The motives that induced him to return to the Roman Catholic church are not known. Most writers consider that he was actuated by avarice and ambition, but a critical appreciation of his character would lead us to doubt this harsh judgment. He was, it has been supposed, desirous of discovering a church broad enough to form the basis of a universal Christianity. Men holding such opinions are always misunderstood, and so D., even after his return to Rome, was still suspected of heresy. In consequence, he was imprisoned in the castle of St. Angelo, where he died, Sept., 1624. Being subsequently condemned as a heretic, his body was raised from its grave, and burned.

While at Padua, D. wrote his *De Radiis Visus et Lucis in Vitris Perspectivis et Iride* (Venice, 1611). He was the first to point out that in the phenomenon of the rainbow, the light undergoes, in each rain-drop, two refractions and an intermediate reflection.

DOMIN'IUM, a Roman law-term, which has been received into the technical language of most of the legal systems of Europe. It may be described as a full legal right in and to an object—as the right from which alone legal possession could flow, but which actual possession alone could never confer, unless such possession had endured for the period of legal prescription. The right to possess is thus distinguished from the right arising from possession, which is the usufruct. Ownership or D. may be either absolute—that is to say, it may include the beneficial interest in the subject—or it may be bare ownership, consisting in some limited power over it at the time, or some ultimate right to it at a future time. D. must not be confounded with imperium (q.v.), which has a totally different signification.

DOM'INO, the name formerly given to the garb worn in winter by priests while officiating in cold edifices. It is now used to signify a masquerade costume, consisting of an ample cloak or mantle with wide sleeves. See MASQUERADE.

DOM'INOS, the name of a game, usually played with 28 oblong, flat pieces of ivory or bone, etc., each of which bears two numbers marked by points from nought to six. The party wins who has first played out his tablets, or, if this has been found impossible, who has the fewest points on the tablets still remaining. The game of D. has been attempted to be traced back to the Greeks and Hebrews, and also to the Chinese. So much is certain, that it was introduced about the beginning of the 18th c. from Italy into France, where it immediately became popular in the larger towns. From Paris it spread to Germany, where, as in France, it is now played in every coffee-house. The Cafe de l'Opera, in Paris, long boasted of assembling the most expert players; an honor, however, which was warmly contested by the establishments of Rouen and Poitiers.

DOM'INUS, the Latin word by which we commonly render lord, but which more properly signifies master, as opposed to slave (*servus*). Aurelianus is said to have been the first emperor who adopted D. as a title of honor on his medals, though it had long been made use of in conversation and in correspondence in that sense, as by Pliny in addressing Trajan. In legal phraseology, the *dominus litis* is the person really interested in the issue of an action, though not necessarily the pursuer.

DOMITIA'NUS, T. FLAVIUS, emperor of Rome from 81 to 96 A.D., was the son of Vespasian, and younger brother of Titus, whom he succeeded on the throne. The earlier years of his reign were on the whole advantageously occupied for the public benefit. Many good laws were passed, the provinces carefully governed, and justice rigidly administered. As he grew older, however, his ambition, his jealousy, and his pride, wounded by the failure of his campaigns against the Dacians and the Marcomanni, in 87 A.D., began to instigate him to the most atrocious cruelties. By murder or banishment, he deprived Rome of nearly every citizen conspicuous for talent, learning, or wealth. To win the army, he greatly increased the pay of the soldiers, and secured the favor of the people by prodigal largesses and gladiatorial shows and games, in which he sometimes took part in person. His cruelties became at length so intolerable, that a conspiracy—encouraged, if not organized—by his wife Domitia, whom he had doomed to death, was formed against him, and the tyrant fell under the dagger of the assassin, 18th Sept., 96 A.D.

DO'MO D'OS'SOLA, a charming little t. in the extreme n. of Piedmont, at the foot of the Simplon, near the right bank of the Tosa, which flows into Lago Maggiore. Its general aspect is peculiarly Italian. It has some trade and several handsome buildings, but is chiefly noteworthy as being a starting-point for tourists who wish to make excursions up the southern valleys of the Alps. The chief places of interest in the vicinity are the Val Anzasca, the Val Vigezzo, and the Falls of the Tosa. From D. D. the Simplon can be ascended in seven hours. Pop. 2,480.

DON (anc. *Ta'nais*), a river of Russia, has its source in a small lake in the government of Tula, in lat. about 53° 45′ n., and long. 38° 10′ east. It flows at first in a south-eastern direction through the governments of Tula, Riazan, Tambov, and Woronetz, and after winding s.w. through the country of the Don Cossacks, it advances to its embouchure in the sea of Azov, which it enters by three mouths, only one of which is navigable. The D. receives 80 affluents, of which the principal are the Sosna and the Donetz on the right, and on the left the Khoper, the Medvieditza, the Sal, and the Manitch. Its total length is about 1150 miles. Its course is obstructed by frequent

sand-banks, which, when the water is low, render navigation impossible to any but flat-bottomed boats. From April to June, however, during which months it overflows its banks, and forms unwholesome swamps on either side, it is navigable as high as Zadonsk, 600 m. from its mouth. The D. is connected by a canal with the Volga, and by this means the produce and manufactures of the interior are conveyed to the southern provinces of Russia. The waters of the D. abound in fish, the traffic in which commodity is considerable, especially in its lower course.

DON, a river of Aberdeenshire, rising on the w. border of the county in a peat-moss, 1640 ft. above the sea. It runs n.e., then e., and lastly s.e., entering the sea a mile n.e. of Old Aberdeen. It has a total course of 78 m., but only 42 in a straight line, and it drains a tract of 495 sq.m., chiefly composed of granite and gneiss, with a little syenite and clay-slate. In the upper part of its course, it receives some large mountain streams, but its chief tributary is the Ury, which comes 24 m. from the n.w. Near the junction of the Ury and D. is a curious conical gravel hillock, called the Bass, the subject of a prophecy by Thomas the rhymer. The D., at less than a mile from the sea, is crossed by the old "birg o' Balgownie," of one Gothic arch. Lord Byron, while a youth, had a superstitious dread in crossing this bridge, from an old prophecy connected with it. To keep this bridge in repair, sir Alexander Hay, in 1605, left an annuity of £2 5*s.* 8½*d.*, which sum has now accumulated to about £19,000, in addition to about £17,000 spent 40 years ago in the erection of a new bridge over the D., a quarter of a mile lower down.

DON, a title. See DOM, *ante*.

DON, or DUN, a river of the West Riding of Yorkshire, rising in the moors on the borders of Derbyshire and Cheshire. It runs 55 m., first s.e. to Sheffield, and then n.e. by Rotherham, Doncaster, and Thorne, into the Aire, which soon afterwards unites with the Ouse. Its basin consists of carboniferous and permian strata. Its chief tributaries are the Rother, Dearne, and Wente. It is navigable for the last 39 m. of its course below Sheffield, by the aid of artificial canals and cuts.

DO'NA, SAN, a t. of n. Italy, in the province of Venice, 18 m. n.e. from Venice, on the left bank of the Piave. Pop. 5,550.

DOÑA AÑA, a co. in New Mexico, on the border of Texas and Mexico, intersected by the Rio Grande and the Rio Pecos, and by several mountain ridges; about 20,000 sq.m.; pop. '70, 5,864. The productions are wheat, corn, wool, and live stock. Co. seat, Doña Aña.

DONABUE, a t. of Pegu, stands on one of the main branches by which the Irrawaddy enters the bay of Bengal, lat. 17° 10′ n., and long. 95° 27′ east. It is within the delta of this grand artery of the country, and is situated 65 m. to the n.w. of Rangoon, and 54 to the n.e. of Bassein, the principal seaports of the newly acquired British province. It is only on historical grounds, however, that the place is worthy of notice. Here the English were repulsed with considerable loss in both the Burmese wars; first in 1825, and again in 1853.

DONAGHADEE', a seaport in the n. of the co. of Down, on the Irish Channel, 18 m. English (14 Irish) e.n.e. of Belfast, and 22 m. s.w. of Portpatrick, Wigtonshire, with which it is connected by a submarine telegraph cable. It forms a crescent round the harbor, with two chief streets, one facing the sea. Its exports are cattle, grain, potatoes, etc. The embroidery of muslin was established in D. about 50 years ago, and it still maintains its pre-eminence in this branch of manufactures, which gives employment to the greater part of the female population. Pop. '71, 2,226. On the n. of D. is a conical mound, 140 ft. high, 480 ft. in circuit at the base, and surmounted by a modern miniature castle 50 ft. high, whence there is a very extensive prospect, including the Scotch coast and the Isle of Man. The Danes, in 837, are said to have destroyed a university which stood on a level a little s. of where D. now is.

DONALDSON, JAMES LOWRY, b. Md., 1814; graduate of West Point; served in the Florida and the Mexican wars, and in the war of the rebellion, in all with distinction; rose to be maj.gen. in 1865, and in 1869, retired from active service. He wrote *Sergeant Atkins*, a tale of the Florida war.

DONALDSON, JOHN WILLIAM, was b. in London, June 10, 1811. His father, Stuart Donaldson, a wealthy merchant, was descended from an old Scotch family; his mother was daughter of J. Cundall, esq. of Snail Green, Lancashire. He was educated first at the university of London, and afterwards at Trinity college, Cambridge. He graduated as B.A. in the year 1834, and obtained the second place in the first class of the classical tripos. The year following, he was elected fellow. His first work was a volume, entitled *The Theater of the Greeks*, partly original and partly compiled, which, having been carefully revised and improved in six successive editions, still holds its place as a school and college class-book. He was still resident at Cambridge, holding the office of assistant-tutor of Trinity, when he published the first edition of his *New Cratylus* (1839), a work remarkable for its research, erudition, and boldness, and as being the first attempt, on a large scale, to familiarize Englishmen with the principles of comparative philology, as established by the great scholars of Germany—Pott, Bopp, Grimm, and

others. Availing himself largely, but not servilely, of the labors of these men, he developed their principles, and continued their researches, with a special application to the history, structure, and etymology of the Greek language. The *New Cratylus*, in its latest, largest, and most improved form, is still the most important work which has been written in English upon the subject. Mr. D. soon after married the daughter of sir John Mortlock of Stapleford, and accepted the post of head-master of the grammar-school of Bury St. Edmunds, having previously taken holy orders. Notwithstanding the engrossing nature of his duties as head-master, he found time to prosecute and extend his linguistic studies, embracing in their wide range Hebrew and Arabic, and most of the dialects of modern Europe. In the *Varronianus*, of which the first edition appeared in 1844, he undertook to accomplish for Latin philology what in the *New Cratylus* he had done for Greek. He dedicated the work to the bishop of St. Davids (Dr. Thirlwall), in grateful recognition of the benefits derived from his Cambridge teaching. Among his other works of this period may be mentioned an edition of Pindar, of the *Antigone* of Sophocles (with a verse translation), *Maskil le Sopher* (a treatise on Hebrew grammar), and finally *Jashar*, a book written in Latin, and published at Berlin, the object of which was, by critical tests, to distinguish the fragments of the lost book of *Jashar* imbedded in the Pentateuch. This book was violently assailed by the so-called "religious press," which did not prevent its undaunted author from issuing a second edition.

Soon afterwards he resigned his place at Bury St. Edmunds, and returned to Cambridge, where he gave a course of lectures on Latin synonyms, and occupied himself with tuition. Here he wrote a volume entitled *Christian Orthodoxy*. Some critics vehemently disputed its right to the title. A smaller volume on classical scholarship followed. He had previously issued a *Greek Grammar* and a *Latin Grammar* for the use of schools. These, during his residence at Cambridge, he recast and enlarged, so as to rival in profundity and copiousness any other works on the same subjects. In 1856, he was appointed one of the classical examiners in the university of London, an honor which he owed chiefly to the strenuous report of Mr. Grote, the historian of Greece.

He was engaged in superintending the compilation of a new *Greek Lexicon*, when his health, for the first time, began to show symptoms of failure. A tour in Germany during the summer of 1860 did not produce any change for the better. Incipient disease of the brain, the result of overwork, showed itself first by neuralgic pains, and afterwards by more alarming symptoms. He removed to London, and died in his mother's house, after some weeks of great suffering, borne with calm and patient courage, on the 10th of Feb., 1861. In private life, he was distinguished by kindness of heart, ready wit, unfailing vivacity, and varied conversational powers. It ought, perhaps, to be mentioned that a little work, published anonymously under the title of *Philelentherus Anglicanus*, which made no small sensation at the time of its appearance, has been very generally attributed to Dr. Donaldson.

DONALDSON'S HOSPITAL, an extensive establishment at Edinburgh, of the character of Christ's hospital, London. Its founder was James Donaldson, a successful printer in Edinburgh, son of Alexander Donaldson, publisher, of whom some notice is taken in the articles BOOK-TRADE and COPYRIGHT. In 1763, Alexander started the *Edinburgh Advertiser* newspaper, which was afterwards conducted by his son James, and became a lucrative concern in his hands. Dying in 1830, James bequeathed the fortune of two generations, amounting to about £215,000, to trustees, for the endowment and erection of a hospital for the maintenance and education of poor boys and girls. The building, which occupies a commanding situation to the w. of Edinburgh, was begun in 1842, and finished in 1850, is a large and beautiful quadrangular structure, in the Elizabethan style, the late W. H. Playfair being the architect. The cost of the edifice and furnishings was nearly £124,000, but as this was defrayed by the accumulated interest, the original endowment remained untouched. The hospital can accommodate 300 children —150 boys and 150 girls: in 1877, it contained 214 children (120 boys and 94 girls), of whom 115 (70 boys and 45 girls) were deaf and dumb. Those eligible for admission are declared to be, "1st, Poor children of the name of Donaldson or Marshall, if appearing to the governors to be deserving; 2d, Such poor children as shall appear to be in the most destitute circumstances and the most deserving of admission." None are received whose parents are able to maintain them. The children are clothed and maintained in the hospital, and taught such useful branches of a plain English education as will fit the boys for trades, and the girls for being servants. The age of admission is from seven till nine, and that of leaving the hospital fourteen years. The children wear a simple uniform of modern fashion.

DONATELLO (properly, DONATO DI BETTO BARDI), one of the restorers of the art of sculpture in Italy, was b. at Florence, in 1383. He belonged to the Donato family, which reckons several scholars among its members, and has given some doges to the republic of Venice. *Donatello* was a diminutive given to the artist in childhood. He received his earliest instructions from Lorenzo Bicci. His first great works in marble were the "St. Peter" and "St. Mark" in the church of St. Michael in his native city. His own favorite, however, was the statue of an old man in the garb of a senator, on the steeple of the same church. It is known under the name of *Zuccone* (the gourd

or bald-head). He died at Florence, Dec. 13, 1466. D.'s principal works, besides those already mentioned, are a statue of "St. George" (in marble), "Judith bearing the Head of Holofernes" (in bronze), the "Crucifixion" (in wood), several statues of the "Baptist" (executed in various materials), and a grand equestrian statue (in bronze) of Erasmus Gattemelata, erected on one of the public places of Padua. He also executed a number of bass-reliefs. The whole tendency of D.'s genius was towards a reproduction of the antique; and his style, though not free from harshness and the rudeness of early art, sometimes reminds one of the glorious productions of ancient Greece.

DONA'TI, GIOVANNI BATTISTA, 1826–73; an Italian astronomer, professor in the royal institution at Florence. June 2, 1858, he discovered the comet now bearing his name. He discovered other comets, made spectroscopic observations, and published diagrams of lines in the spectra of the stars. In 1864, he was appointed director of the Florence observatory.

DONA'TION. A donation in prospect of death, *donatio mortis causa*, differs from a gift *inter vivos*, inasmuch as it is incomplete, and revocable during the donor's life, or ambulatory, as lawyers say. It differs from a legacy, on the other hand, in that it requires no probate, for it is not a testamentary act, the donee's title proceeding directly from the donor in his life-time. In Scotland, following the law of Rome, it is common to distinguish between donations *pure*—or those which do not take place in anticipation of death, marriage, or any other specific event—and gifts. Such donations are in reality gifts, but gifts which are not intended to be immediately delivered. It was with reference to this species of D. that the equitable arrangement called the *beneficium competentiæ* was introduced, by which the donor was allowed to retain as much as was necessary for his own subsistence before fulfilling the obligation, if he was reduced to indigence. Another implied condition of a D. by the Roman law was, that when any one who had no children made a D. of the whole or the greater part of his estate, the D. became void if he had children afterwards; the presumption being, that he would not have given his property away if he had anticipated that he was to become the father of a family. It is a general principle of law, that a D. is never presumed; but this rule suffers an exception in the case of aliment given without an agreement to pay board, which is presumed to be gratuitous unless given by one who makes a livelihood of entertaining strangers. Minors, and persons incapable of contracting, are not presumed to have been alimented gratuitously, unless their relationship to their entertainer be such as to warrant the presumption. Where the minor is possessed of an adequate separate estate, even the father may claim the expense of maintaining him, and the rule applies with greater force to all more distant relatives. Donations between man and wife (*inter virum et uxorem*) were by the Roman law, and are by the law of Scotland, revocable by the donor at any time during his or her life, *ne conjuges mutuo amore se spolient* (lest the spouses should despoil themselves from mutual love). But mutual grants for substantial considerations between the spouses are not revocable, if there be any reasonable proportion between the two. Thus, where there has been no ante-nuptial contract of marriage, the husband may provide for the wife in the event of her survivance, and the provision will be effectual in so far as it is rational. It will be revocable only *quoad excessum*. Donations in the prospect of marriage (*donationes propter nuptias*) in the Roman law were given by the husband in security of the dowry or *dos*, which he was bound to pay back to the wife or her relatives on the dissolution of the marriage. When the *dos* was returned to the wife, the D. was returned to the husband. In the law of Scotland, when donations *propter nuptias* are spoken of, we are to understand provisions made by the husband not with a view to the dissolution of the marriage, but as an equivalent for the dowry, or, as it is called in Scotland, the *tocher*.

DONA'TI'S COMET, discovered June 2, 1858. It was nearest the earth Oct. 10, when its apparent length, 51,000,000 m., made it a sight of wonderful magnificence. Its distance in aphelion is estimated at 15 billions m., and its return to the solar system is not expected till the year 3808.

DO'NATISTS were the followers of Donatus, a Numidian bishop who opposed the election of Cecilianus in 311 A.D. to the bishopric of Carthage, on the ground of the ordination having been performed by one who had been a traditor, or traitor—that is, one who, during persecution, had given up the sacred books to the pagan authorities; and also because Cecilianus had exhibited great hostility towards the victims of the late persecution. After some time, the council of Arles (Aug. 1, 314 A.D.) decided against Donatus, who in a short time seceded from the Catholic church, and formed a distinct sect, which, by 330, had 172 bishops in northern Africa. The D., like the followers of Novatian (q.v.), went upon the principle, that the essence of the true church consisted in the purity and holiness of all its members individually, and not merely in its apostolical and Catholic foundation and doctrine. They therefore both excommunicated all lapsed and gross offenders, not receiving them again but on being re-baptized, and also held that the efficacy of the sacraments depended on the worthiness of the administrator. Driven to fanaticism by the oppression of the secular power, they not only denied to the state all right to meddle with ecclesiastical affairs, but bands of Donatist ascetics collected, attacked the imperial troops (348), and continued to devastate Mauritania and Numidia for a dozen years. In the beginning of the 5th c., they seem to have almost

equaled the Catholics in number, and the eloquence of Augustine and these verities of Honorius were exercised upon the sect in vain; they continued to exist as a separate body. But by adopting a more prudent plan of proceeding, the Catholic bishops had, by the end of the 6th c., induced most of those that had left to return to the bosom of the church; and in the 7th c. the D. were extinct. Donatism is regarded by Neander (see *Dogmengeschichte*, translated into English by J. E. Ryland: Bohn, vol. ii. page 394) as a reaction against that form of Catholicism, "which conceived the church to be an outward organism, continued by the succession of bishops, who formed the necessary medium of communication with Christ, and for partaking in the Holy Spirit and salvation." "Whoever is shown to be a Christian in a right and lawful manner, is to me a Catholic," was a saying of the D.; while the church in general, guided by Augustine, wished to let the worthy and unworthy remain mixed together, and to defer the separation to the final judgment." Thus, while the D. had the merit of superior strictness of theory, it must be acknowledged that their views were less practical than those of their opponents.

DONA'TUS, ÆLIUS, a well-known grammarian and commentator, who taught grammar and rhetoric at Rome about 355 A.D., and was the instructor of St. Jerome. He wrote treatises, *De Literis; Syllabis; Pedibus et Tonis; De Octo Partibus Orationis;* and *De Barbarismo; Solecismo*, etc., the best edition of which is in Lindemann's *Corpus Grammaticorum Latinorum* (vol. i.). These writings form together a pretty complete course of Latin grammar, and in the middle ages were the only text-book used in the schools, so that Donat came, in the w. of Europe, to be synonymous with grammar, or with the elements of any science. *The Donat into Religion* is the title of a book by an English bishop, and there was an old French proverb, *Les diables estoient encore à leur Donat* (The devils were yet in their grammar). The Latin grammar of D. has formed the groundwork of the elementary treatises on that subject to the present day. D. was one of the first books on which the art of printing by means of letters cut on wooden blocks was tried, and copies of these Donatuses are reckoned among the greatest of bibliographical curiosities. The author also wrote a commentary on Terence, of which we possess only a part extending to five comedies, to be found in the edition of Terence by Kloz (2 vols., Leip. 1838).

From this D. we must distinguish a later grammarian, TIBERIUS CLAUDIUS DONATUS, from whom we have a very worthless life of Virgil, prefixed to many editions of that poet, and fragments of a commentary on the *Æneid*.

DONAUWÖRTH, a t. of Bavaria, situated at the confluence of the Wernitz and the Danube, about 25 m. n.n.w. of Augsburg. It is well built, in the form of an amphitheater, round the side of a hill, and is surrounded by walls. It was formerly a free imperial city of considerable importance, but it has now sunk into an insignificant place of 3,000 inhabitants. It is historically interesting, however, as the main cause of the thirty years' war; the severity of the punishment meted out to the inhabitants in 1607, in consequence of their adoption of the reformed doctrines, and their assault on a Roman Catholic procession of the "host," having led to the formation of the Protestant league, and Catholic union, the opponents in that long and severe struggle. It is likewise associated with the name of Marlborough, who stormed and carried the intrenched camp of the Bavarians here in 1704. Also, on the 6th Oct., 1805, the French, under Soult, obtained a victory here over the Austrians, under Mack.

DONAX, a genus of lamellibranchiate mollusks, of the family *tellinidæ*, with shell of two equal valves, which close perfectly, and are of a triangular form, prettily striated from the beak to the margin, the beak occupying the obtuse angle of the triangle. The species of D. are generally small. Several are found on the British coasts. The fossil species are not numerous, and belong to the eocene formation.

DON BENI'TO, a t. of Spain, in the province of Badajoz, 55 m. e. of the city of that name. It is situated near the left bank of the Guadiana, and is in general well built, with wide and tolerably clean streets. It has several squares, the chief of which is lined with the principal structures in the town, including the town-hall, prison, and a convent; and in the center is a public promenade. D. B. has manufactures of woolens, wine, and oil, and its proximity to the Guadiana affords it great trading facilities. Pop. about 15,000.

DON CAR'LOS. See CARLOS.

DONCASTER, a municipal borough in the West Riding of Yorkshire, on the right bank of the Don, on the Great North road, 35 m. s. of York. The country around is flat, but beautiful. Fine old elms line the broad and level road from the south. D. is very clean and well built. The High street is a mile long. It has manufactures of iron, brass, sacking, linen, and agricultural machines. Its corn-market is one of the largest in the kingdom. Pop. '71, 18,768. D. was the ancient *Danum*, and lay on the Roman road from York to Lincoln. Roman coins, urns, and a votive altar have been found here. It was the *Dona Castre* of the Saxons. The Saxon Northumbrian kings had a palace here. D. was burned by lightning in 759, and frequently ravished by the Danes. It has long been famous for its annual races, begun in 1703, and held a mile s.e. of the town in the second week of Sept. Col. St. Leger, in 1776, founded stakes

which have been yearly run for by the best horses in England. On an eminence 5 n w.s.w. of D. are the ruins of Conisborough castle, a Norman-Saxon round tower, 37 ft. in diameter and 86 ft. high, with walls 15 ft. thick, strengthened by square buttresses reaching the whole height. The door is arrived at by an external flight of 37 steps, and within is a cylinder open to the heavens.

DON COSSACK, a government in Russia in Europe, n.e. of the sea of Aral, on the river Don; 61,911 sq.m.; pop. '70, 1,086,264. The country is generally level and sandy, and the climate mild, though in winter there are sometimes very cold and severe storms. Cattle-raising is the principal business; hemp and flax are raised, and wine, salt, and caviare are among the exports. Seat of government, Novo-Tcherkask.

DONDRA HEAD, the most southerly extremity of Ceylon, is in lat. 5° 55′ n., and long. 80° 38′ east. As compared with cape Comorin, the corresponding point in the peninsula of Hindustan, it more directly faces the Indian ocean, and lies nearer the grand thoroughfares of eastern commerce. An adjacent village of the same name numbers 900 inhabitants.

DONEGAL', a seaport in the s. of Donegal co., at the mouth of the Eske, on a shallow creek of Donegal bay, 11 m. n.n.e. of Ballyshannon. It lies in a rich alluvial tract, surrounded on three sides by hills, behind which rise lofty picturesque mountains. Pop. '61, 1516; '71, 1422. D. exports corn and butter. On the river is Donegal castle, formerly belonging to the O'Donnels of Tyrconnel. On the shore are the ruins of a Franciscan monastery, founded in 1474 by Hugh O'Donnel. Near D. is a frequented sulphureo-chalybeate spa.

DONEGAL, a maritime co. in Ulster province, and washed by the Atlantic on the n. and west. Its greatest length is 85 miles; greatest breadth, 41; average, 27; area, 1865 sq.m., one third being arable, and $\frac{1}{100}$ in wood. The coast-line is 395 m. long, being indented by many deep bays, and loughs, some 2 to 20 m. broad, and 15 to 25 long. Some of the coast cliffs rise from 500 to 800 feet. Of the many isles off the coast, 17 are inhabited. Except a small tract in the e. and s.e., the surface is mountainous, moory, and boggy, with many small lakes and rivers, associated with endless fairy tales and traditions. The highest hill, Erigal, rises 2,462 ft., and several other hills exceed 2,000 feet. The mountain-ridges run n.e. and s.w. The largest stream is the Foyle, running 16 m. n.e. into Lough Foyle. Derg is the largest loch. The geological structure of D. consists of granite, metamorphic rocks, and graywacke, with Devonian and carboniferous limestone strata and trap. White marble occurs at Dunlewy. Except on the Foyle, the climate is moist, raw, and boisterous from violent w. and n.w. winds. There are many ruins of houses and churches overwhelmed with sand. Of the Irish counties, D., in ratio to its area, has least land in cultivation and occupied in towns and woods. The soil is generally cold and poor on the primitive rocks, and light clay on the slaty. In 1878, 237,222 acres were in crop, the largest proportion being oats, potatoes, turnips, and flax. There are manufactures of linen, worsted stockings, worked muslins, and kelp, and fisheries of cod, sole, plaice, herring, and mackerel. Trade is chiefly through Londonderry. Inaccessible retreats and abundance of turf-fuel made D. at one time the chief seat of illicit distillation in Ireland. It contains 6 baronies, 8 poor-law unions, and 51 parishes. Pop. '41, 296,448; '51, 255,160; '71, 218,324, of whom 165,270 are Roman Catholics, 27,125 Episcopalians, 23,080 Presbyterians, and the rest of other denominations. D. sends two members to parliament. The towns are small, the chief being Lifford, the county town; Ballyshannon, Letterkenny, Rathmelton, Donegal, and Killybegs. Industrious farmers and artisans occupy the low fertile tracts. The population of the mountain districts has been much diminished by emigration. Till 1612, when James I. planted Ulster with English and Scotch settlers, the s. part of D. was called Tyrconnel, and belonged to the O'Donnels, who, from the 12th c., were inaugurated as princes of Tyrconnel on Doune rock, near Kilmacrenan. D. has many ruins and traces of forts, of 30 religious houses, castles, and of the palace of the north Irish kings on a hill near Lough Swilly. Near Derry is the coronation-stone of the ancient Irish kings. D. contains many memorials of St. Columba. Warren, in 1798, captured a French fleet off Tory isle, which contains the remains of seven churches, two stone crosses, and a round tower. St. Patrick's Purgatory is on an isle in Loch Derg. Near Horn Head is a hole in the roof of a cave, called M'Swiney's Gun, from which issue, at times, jets of water with loud explosions.

DON'ELSON, FORT, on Cumberland river, Tenn., 12 m. e. of Fort Henry. It was an important point in the war of the rebellion, and was strongly held by the confederates until Feb., 1862, when the union forces under Grant laid siege to it. Buckner, the confederate commander, asked for terms, to which Grant replied: "No terms except unconditional surrender will be accepted. I propose to move immediately upon your works." Before night the fort and 8,000 prisoners were surrendered.

DONETZ', a river in s. Russia, a tributary of the Don. It is about 500 m. long, and is chiefly in the country of the Don Cossacks. It is navigable to Zmiev.

DONGARPUR', a fortified t. of Rajputana, in Central India, is in lat. 23° 50′ n., and long. 73° 45′ e., and is 345 m. to the n. of Bombay. It is the capital of a protected state of the same name, which contains 1000 sq.m., and 100,000 inhabitants.

DONG-NAI' is the name of a river and a t. in Anam or Cochin-China, an oriental state which has recently derived an adventitious interest from the combined attacks of France and Spain.—1. The river enters the Chinese sea, by various mouths, about lat. 10° 20′ n., and long. 107° east. It is navigable for large vessels as far up as Sai-gon, which, with a pop. of 180,000, and a trade of great value, stands 40 m. from the coast. From this city, a canal of 23 m. in length connects the D. with the Menam-kong, or Cambodia, which, in a more westerly channel, divides Anam from Siam.—2. The town is on an affluent of the river, being 25 m. to the n.e. of Sai-gon.

DONGOLA (NEW), or MARA'KAH, a t. of Nubia, capital of a province of the same name, is situated on the left bank of the Nile, in lat. 19° 10′ n., long. 30° 22′ east. D., which is a military station, is also a place of considerable trade. Its exports are chiefly slaves, in return for which it receives goods of all kinds from Cairo. Its bazaar is well supplied, and it has an indigo-factory belonging to the khedive of Egypt. Pop. estimated at 20,000. In the vicinity, on the fertile river-island of Argo, are the ruins of old Ethiopian and Egyptian buildings, colossal statues, etc.—OLD DONGOLA is a ruined town on the right bank of the Nile, 75 m. s.s.e of New Dongola. On the e. side, the desert in some places stretches down to the water-edge.

DONIPHAN, a co. in n.e. Kansas, on the Nebraska border and the Missouri river; crossed by the old California overland route, and by the Atchison and Nebraska, and the St. Joseph and Denver City railroads; 391 sq.m.; pop. '78, 15,122. The surface is chiefly prairie, and the soil good, producing wheat, corn, oats, butter, etc. Co. seat, Troy.

DO'NIS CONDITIONAL'IBUS, STATUTE DE, called also the statute of Westminster the Second, 13 Edw. I. c. 1, is the statute which first established in England the power of creating an entail (q.v.). Before the passing of this act. it had been held by the judges that a conveyance to a man and the heirs of his body was a fee-simple conditional, i.e., a fee-simple (q.v.) on condition that the donee should have heirs of his body; and this condition having been purified by the birth of an heir, the donee was at liberty to alienate or burden the land, and thus to defeat the original gift. In this respect, however, the gift differed from a fee-simple, that if the donee failed to exercise his power of alienation, and died without issue surviving, the land descended not to the heirs of the donee, but to those of the donor. To counteract the decision of the judges above noticed, the statute *de donis* was passed. It provided "that the will of the giver, according to the form in the deed of gift manifestly expressed, shall be from henceforth observed." From the date of this act, the courts recognized two estates in the land—viz., that of the donee, which is called a fee-tail (q.v.), and that in the donor, which was a reversion or expectancy, by which, on the termination of the estate-tail, the lands would revert to the original owner. As to the manner in which even this intention was defeated, see ENTAIL. Not only lands, but rents, dignities, etc., might be entailed under this act. *Co. Litt.* 20 *a.*

DONIZET'TI, GÄETANO, a famous Italian composer, was b. at Bergamo, in Lombardy, 1798. He learned the elements of music at the lyceum of that town, and later, the art of composing under Simon Mayr. D.'s first compositions belonged exclusively to church-music, but the only success he obtained by them was an appointment as a chorister at the church of Basilica di San-Maggiore. D. gave up that position very soon, and after several vicissitudes, entered the military service of Austria. D. now devoted himself to the composing of operas, of which he has left more than 60. *Enrico di Borgogna,* 1819, with 19 others that followed, failed to produce any marked result; and it was not until 1831 that his renown began to spread beyond Italy. *Anna Bolena, L'Elisir d'Amore, Lucrezia Borgia, Marino Faliero, Lucia di Lammermoor, La Fille du Régiment,* followed each other in rapid succession, adding new luster to his fame. D.'s last productions were *Don Sebastiano* and *Caterino Cornaro.* He died at Bergamo in 1848. Among modern Italian composers, D. is reckoned to be nearest to Rossini, whose style he imitated during the first stage of his career. D.'s music is praised not so much for melody as for dramatic truth and solidity of execution.

DON'JON, or DUNGEON, the principal tower or keep (q.v.) of a castle (q.v.) or fortress. It was so called either from being placed on a *dun* or elevation, natural or artificial, or because, from its position, it dominated (Lat. *dominio,* corrupted into *domgio, dongeo*) or commanded the other parts of the fortress. From the circumstance that the lower or under-ground story of the donjon was used as a prison, has come the modern meaning of the word. See CASTLE.

DON JUAN is a legendary and mythical personage like Dr. Faustus. The two have been made the representatives of two different tendencies, both proceeding from the same principle—from the principle, namely, of unbelief and godlessness, which necessarily turns self into either a god or a beast—the principle of subjectivism, or selfishness become dominant. In Faust, expression has been given to the subjective idealism of the Germanic nations, their tendency to subtle speculation and a rationalism antagonistic to faith. In D. J. appear the practical materialism and refined sensualism of the Romanic peoples, and the tendency of blind belief in a corrupt catholicism to pass into unbelief.

Although Faust and D. J. have thus the same source and the same termination, yet, as they proceed from opposite poles, they stand in contrast to each other, and, as was natural, have found different vehicles of expression—Faust in poetry, D. J. in music. The ideal of the D. J. legend is presented in the life of a profligate who gives himself up so entirely to the gratification of sense, especially to the most powerful of all the impulses, that of love, that he acknowledges no higher consideration, and proceeds to murder the man that stands between him and his wish, fancying that in so doing he had annihilated his very existence. Partly in wanton daring, partly to allay all uneasy misgiving, he then challenges that spirit in which he disbelieves to demonstrate to him its existence in the only way he holds valid—namely, through the senses. When this actually happens, when the spirit proves its existence and power by animating the marble statue which he had, with daring mockery, invited as his guest, and summoning him to the final tribunal, compels him to acknowledge the supremacy of spirit, and the worthlessness of a merely sensuous, godless, and immoral existence, it is all over with him, he is crushed, and sinks into hell.

This ideal career is aptly enough localized in one of the most luxurious cities of the once world-monarchy of the Saracens—viz., Seville—and the characters wear the names of the ancient noble families of the place. The hero of the story, D. J., is described as a member of the celebrated family Tenorio, and is represented as living sometimes contemporary with Peter the cruel, sometimes with Charles V. The chief aim of his sinful career is the seduction of the daughter of a governor of Seville, or of a nobleman of the family of the Ulloas. Being opposed by the father, he stabs him in a duel. He then forces his way into the family tomb of the murdered man, within the convent of San Francisco, causes a feast to be prepared there, and invites the statue which had been erected to his victim to be his guest. The stone guest appears at table as invited, compels D. J. to follow him, and, the measure of his sins being full, delivers him over to hell. At a later period, the legend came to be mixed up with the story of a similar profligate, Juan de Maraña, who had in like manner sold himself to the devil, but was at last converted, and died as a penitent monk in the odor of sanctity.

The genuine legend of D. J. was first put into form by Gabriel Tellez (Tirso de Molina), in *El Burlador de Sevilla y Convivado de Piedra*. This drama was transplanted to the Italian stage about 1620, and soon found its way to Paris, where numerous versions of it, among others Molière's *Festin de Pierre* (1669), made their appearance. It was brought on the English stage by Shadwell under the title of *The Libertine* (1676). In the end of the 17th c., a new Spanish version of Tellez's play was prepared by Antonio de Zamora, and brought on the stage. It is this version that forms the groundwork of the later Italian versions and of Mozart's opera. It was first put into an operatic form by Vincenzo Righini in *Il Convitato di Pietra* (1777); the text of Mozart's *Don Giovanni* was written by Lorenza da Ponte (1787). Through this famous opera the story became popular all over Europe, and has since furnished a theme for numbers of poets, playwrights, and writers of romance. A. Dumas has a drama, *Don Juan de Maranna;* Byron's *Don Juan* follows the name, and in so far the character of the original; and Prosper Mérimée's novel, *Les Ames du Purgatoire, ou les Deux Don Juan*, is founded upon it.

DONNE, JOHN, D.D., the son of an eminent merchant, cadet of an ancient family in Wales, was b. in London in 1573. His parents were Catholics, and he was educated in that faith. At the age of 11, he went to Oxford, where he remained three years; thereafter, he removed to Cambridge. Although he greatly distinguished himself at these seats of learning, the faith of his parents prevented him from taking a degree. At the age of 17, he entered Lincoln's inn, to read for the bar; and while so engaged, he carefully studied the principal points in dispute between Catholics and Protestants, and finally joined the latter. About this time, he wrote several of his minor poems, the erotic heat of which contrasted strangely with the austerity of his later years. In 1594, he went abroad, and lived for three years in Spain and Italy. On his return, he was made secretary to Lord Ellesmere, then lord keeper of the great seal. Here he fell in love with that nobleman's niece, and they were privately married. When the union was discovered, D. was imprisoned by his enraged father-in-law. After his liberation, he recovered his wife by legal process, and, without settled employment, went to reside at the house of sir Francis Wooley, a kinsman of his wife. After the death of sir Francis, he removed to London, and lived with sir Robert Drury, in Drury lane. With sir Robert he went to Paris; and on his return, at the instigation of James I., who was delighted with the *Pseudo-Martyr*, a book which D. had written against the Catholics, he entered holy orders. He was made D.D. by the university of Cambridge; and after accompanying an embassy to the queen of Bohemia, he was made on his return dean of St. Paul's, and vicar of St. Dunstan's. A fever carrried him off in 1631. His life has been written by Izaak Walton—forming one of the group of "lives" so praised by Wordsworth in a celebrated sonnet.

D.'s works consist of satires, elegies, religious poems, complimentary verses, and epigrams: they were collected and published by his son in 1650. An earlier but imperfect collection appeared in 1633. D. is usually considered as the first of a series of poets of the 17th c., who, under the infelicitous name of the metaphysical poets, all a con-

spicuous place in English literary history. The directness of thought, the naturalness of description, the rich abundance of genuine poetical feeling and imagery, now began to give way to cold and forced conceits, and elaborate exercises of the intellect. Yet it is generally acknowledged that, amid much rubbish, there is not a little real poetry, and that of a high order, in Donne. His fancy was rich and subtle, his wit singularly keen and poignant, and his word-painting such, that, if he had possessed, in addition, music and sensibility, he would probably have enjoyed a perpetual popularity.

DON'NYBROOK, or ST. MARY'S OF DONNYBROOK, a village and parish in Dublin co., Ireland; now included in Pembroke, a western suburb of Dublin. The parish contains the villages of Donnybrook, Irishtown, Merrion, Ringsend, and Sandymount. The village of Donnybrook was long noted for its fair (begun under king John), kept up for half the month of August every year. In later times the fair lasted only a week. It was long notorious as a season of debauchery and fighting, and in 1855 was finally abolished.

DON QUIXO'TE. See CERVANTES.

DOO, GEORGE THOMAS, one of the best English historical engravers of the present day, was b. in the parish of Christ Church, Surrey, Jan. 6, 1800. He has made himself best known by his famous plate of "Knox Preaching before the Lords of the Covenant," after Wilkie; while his admirable rendering of Eastlake's "Italian Pilgrims coming in sight of Rome," his exquisitely finished heads of women and children, after Lawrence, his engravings from Raffaelle, Correggio, and others, have succeeded in winning for him a very high place in the estimation of the admirers of his laborious art. In 1851, he was elected a fellow of the royal society, and, in 1856, a royal academician. He was appointed chairman of the engravings committee of the London international exhibition of 1862. In 1864, he completed, after eight years' work, a large engraving of the "Raising of Lazarus," by Sebastian del Piombo.

DOOBOV'KA, a t. on the Volga, in European Russia, government of Saratof; 180 m. w. of Saratof city; pop. '67, 13,676. The town has a number of manufactures, and an important river traffic,

DOOLY, a co. in s.w. Georgia, on Flint river; 530 sq.m.; pop. '70, 9,790—4,855 colored. The land is fertile, but much of it is occupied by pine forests. The chief productions are corn, cotton, and molasses. Co. seat, Vienna.

DOOM, the old name given to the last judgment, and to those representations of it in churches which have a religious rather than an artistic object. Many of the dooms are executed in distemper. In the reign of Edward VI. most of them were washed over, or otherwise obliterated, as superstitious. There is a fine one still remaining in the church of the Holy Trinity at Coventry.

DOOM or DUM PALM (*Hyphæne Thebaica*), a species of palm remarkable for the repeated forkings of its stem. It is a native of upper Egypt and of the central parts of Africa. In some districts, it is the most plentiful tree, sometimes even forming forests, sometimes growing amidst the very sands of the desert. Its leaves are fan-shaped. Ropes are made of the fiber of its leaf-stalks. Its fruit is about the size of an orange, but of a somewhat elongated irregular shape; the outer skin is red, and this being peeled off, a considerable thickness of a spongy dry substance is found within it —also part of the *pericarp*—which has an insipid sweetness, and a remarkable resemblance to gingerbread, so that the tree is sometimes called the GINGERBREAD-TREE. This substance is used as an article of food, and an infusion of it as a beverage. The infusion is cooling, gently aperient, and very salutary in fevers. The albumen of the seed is hard and semi-transparent, and is turned into beads and other little ornaments. Each fruit contains one seed. Egyptian bdellium (see BDELLIUM) is said to be an exudation of this palm.

DOOMSDAY BOOK. See DOMESDAY BOOK.

DOOMSTER. See DEEMSTER.

DOON, a Scotch river, rising in the s.e. of Ayrshire in Loch Enoch. It runs n.w. through Loch Doon (5 m. by ¾ m., amid treeless mountains), past Dalmellington, Burns's monument, and Alloway kirk, to the firth of Clyde, 2 m. s. of Ayr. It is 30 m. long. On leaving Loch Doon, the river flows through Glen Ness, a huge rocky and wooded ravine, not surpassed in picturesque beauty by any similar scenery in Scotland. On an islet in the loch are the ruins of Doon castle, where Edward, brother of Robert Bruce, is said to have lived. Burns has immortalized the D. in song.

DOOR AND DOORWAY, in art. The form of the doorway is determined by the architectural style of the building in which it is placed. In classical buildings, it is generally rectangular in form, though both Greeks and Romans, following the Egyptians, amongst whom the practice was almost universal, occasionally diminished the opening towards the top; and the Romans, in later times, very frequently threw over it the circular arch, which was the characteristic feature of their style. Egyptian doorways are known to us, for the most part, only by the examples which remain in monumental structures; and these, like the other members of the style as thus exhibited, are of gigantic proportions. The doorway of the temple at Edfu measures 74 ft. to its summit, but the lintel and cornice which cover it are so deep and massy as to occupy a space of no less than

23 ft., so that the height of the aperture is only 51. With the Egyptians, the doorway was an architectural object of very great importance. On either side of it, colossal statutes or obelisks were placed, and the approach to it was often lined with rows of gigantic sphinxes.

The Greek doorway was surrounded by moldings, and as the lintel or top-stone which covered it projected on both sides beyond the jambs, the moldings which ran round both jutted out at the place of meeting, forming a sort of shoulders, as in a doorway of Erechtheium. This arrangement, however, was by no means uniform, the moldings of the jambs being frequently quite separated from those of the architrave. The doors themselves, in antiquity, in private dwellings, were generally of wood; and in structures devoted to religious or public purposes, of metal, and occasionally of marble. They were generally paneled, and turned on pivots working in sockets. With the exception of the forms of the windows, and the tracery and foliage of the pillars, doorways are the most characteristic feature in all the styles of Gothic architecture. In the earliest, which we in this country are in the habit of calling Saxon, and which on the continent is commonly known as Romanic, they are of course very plain. There is seldom more than a few simple moldings, surrounding a semicircular arch, and in some of the earliest examples, the head of the opening is covered by two flat stones, leaning upon each other in the center, and their other ends being placed on the imposts, so as to form a triangle. In the Norman style, they become gradually more ornamental. The arch still continued in general to be semicircular, though there are a few instances of the segmental or horse-shoe arch. As the style advanced, the moldings and enrichments became more various. Of these, that which is most characteristic of the style is the zigzag molding. Circular or octagonal shafts were now frequently placed in the jambs, and these, too, were often ornamented with zigzag or spiral moldings, their capitals being enriched with foliage or grotesque heads or figures. The opening of the doorway often does not rise higher than the springing of the arch, and in this case it is generally flat, the semicircular space between it and the arch being frequently ornamented with a sculptured representation of some scriptural subject. The few Norman doors that exist are devoid of ornament, with the exception of projecting nails, and a simple iron scroll-work projecting from the hinge, and stretching to a greater or less extent over the door. As the doorway adheres strictly to the characteristics of the style, early English doorways of course generally terminate in pointed arches. In these the moldings are more numerous, the jambs contain a greater number of small shafts, some of which occasionally stand quite free, and on the whole the work is richer in form, and more finished in execution. The opening of the doorway is now frequently divided into two, either by a single shaft or a clustered column. In the decorated style, the doorways are not in general so deeply recessed as in the early English; and this circumstance takes from them in richness more than they gain in elegance by their greater height, and by the more delicate character of their ornamentation. In these, the moldings are commonly enriched with flowers or foliage, either in running patterns or placed separately at short intervals. Of these, the commonest are the ball-flower (q. v.), and a flower of four leaves, which often projects boldly, and produces a fine effect. The iron scroll-work on the doors resembles that in the former style, except that the terminations are more frequently worked into leaves or flowers. In other cases, the doors are paneled, and covered with characteristic tracery. In the perpendicular style, though the door continues to be arched, it is usually placed under a heavy square external molding. The doorway in this style loses much of the depth and richness which belongs to it in the earlier styles which we have been considering. Shafts are still used in the jambs, though not always, and they are generally small and few in number; the capitals of the jambs rarely possess the same richness of foliage, and frequently consist merely of plain moldings. One or more large hollows are often left in the jambs, forming small niches, which frequently contain statues. This latter characteristic seems to be peculiar to the perpendicular style. In the door ways, as well as in the windows of this style, the four-centered arch came into general use, but two-centered arches, and, in small doorways, ogees, are frequently to be met with. The doors in the perpendicular style, when ornamented, are usually paneled, the upper parts being sometimes covered with tracery, but the fine iron scroll-work of the earlier styles had entirely disappeared.

DOOR, the movable panel by which the opening to an apartment, closet, or passage is closed. Doors are made of wood, iron, bronze, or stone. When moving horizontally on hinges, they are called *swing*-doors; when two such are used to close one opening, they are *folding*-doors. *Sliding*-doors are those which move on rollers, and may be pushed aside. A *jib*-door is one which is concealed as much as possible when shut. A *trap*-door is one which opens vertically over a horizontal opening, as a hole in a floor, etc. When a small door closes an opening cut in a larger one, it is usually called a *wicket*.

Doors are commonly made of wood, and these we shall first describe. The most simply made door is constructed of several boards joined together at their edges by a *rebate*, or a *plowed and tongued groove* (see CARPENTRY); these are held together by a transverse piece simply nailed to each board; this is called a *ledge*, and the door thus made, a *ledge*-door. These are commonly used for workshops, stabling, etc.;

but when durability and appearance are to be combined, a stout frame is first made, its parts joined together by mortise and tenon. See CARPENTRY. This frame has one or more openings—usually four—which are filled with thin pieces called *panels*, fitted into grooves plowed in the edges of the frame. The horizontal pieces of the frame are, according to their position, called the top-rail, bottom-rail, lock-rail, and frieze-rail. The lock-rail is that to which the lock is fixed, the frieze-rail intermediate between the middle and top-rail in large doors. The extreme vertical parts of the frame to which the rails are fixed are called *stiles*, and the intermediate vertical part, a *mounting*. Doors are named one, two, four, six, etc., paneled doors, and are further described by the kind of molding which surrounds the panel, and from the description of panel. The main object of framing, besides appearance, is to counteract the tendency of the wood to warp, by binding the different parts together with pieces having their fibers at right angles to each other.

In many old buildings, the outer, and even some inner doors are made of massive oaken planks, bound together with ornamental iron straps. Iron doors are chiefly used to intercept fire. For this purpose, they are best made of wrought iron, with double sides. Bronze doors are sometimes used for churches and other large buildings. They are usually ornamented with castings in high and low relief. Those of the baptistery of the cathedral of Florence, by Ghiberti, and the pantheon of Rome, are among the most celebrated examples. A few examples of marble doors exist, chiefly in cemeteries and some Belgian churches.

DOOR, a co. in n.e. Wisconsin, between Green bay and lake Michigan; 625 sq.m.; pop. '75, 8,020. Agriculture is the chief business. Co. seat, Gibraltar.

DOO'RA. See DURRA.

DOOR-KEEPER, in the senate and house of representatives of the federal congress, and in the corresponding bodies in state legislatures, an officer chosen by vote of the body who has general charge of the rooms. He announces messages from presidents, governors, or the co-ordinate legislative bodies; attends to the dispatch of documents, and assists the sergeant-at-arms in keeping order.

DOORN, in English, *thorn*, is a common name in s. Africa. It indicates various communes in the Cape Colony. It also designates two rivers, distinguished as *Great* and *Little*, both of them joining the Olifant, or Elephant, on the right, but the smaller from the s.e., and the larger from the north-east.

DOORN'BOOM, *Acacia horrida*, the most common tree in the wastes of s. Africa. The name D. (*thorn-tree*), given to it by the Dutch colonists, and the botanical specific name, are due to the number and sharpness of its spines. It seldom much exceeds 30 ft. in height, but its timber is hard and tough, and is much used for house-carpentry, etc. See ACACIA.

DOOS'TEE, a river of Beloochistan, running s. through the entire country, and falling into the Arabian sea. It is about 900 m. long.

DOQUET, or DOCKET (from the same root as *dock*, to cut off or clip), a small piece of paper or parchment, containing a brief or summary of a large writing. All attestations or declarations annexed to written instruments are called doquets, more particularly those that are done by a notary. The notarial D. is said to be the most ancient example of fixed style in Europe; and though latterly appropriated to the instrument of sasine, it was formerly common to all solemn instruments. It consisted of a Latin attestation, holograph of the notary, annexed to the notarial instrument prepared by him. The name of the notary was set forth, and the authority mentioned, by which he had been appointed to be a notary. In the case of an instrument of sasine, it stated that he was personally present with the witnesses; that he saw, knew, heard, and noted the circumstances mentioned in the sasine; that he prepared the instrument, and the number of pages it contained. In addition to his subscription, the notary was formerly in use in Scotland to add his *signum*, which was a flourish of the pen, called a paraph or ruck. Latterly, he only subscribed the document on each page; and on the last page, opposite to the D., he added to his subscription the motto which he had assumed on his admission as a notary. The notarial D. of instruments of sasine was superseded by 8 and 9 Vict. c. 35, s. 5.

DOR. See DUNG BEETLE.

DOR, or MONT DOR (often written less properly Mont d'Or), a chain of mountains in France comprised in the great group of the Auvergne (q.v.) mountains in the department of Puy-de-Dome. They are clearly of volcanic formation, and rise in the Puy-de-Sancy, which is the highest peak of central France, to the height of 6,190 feet.

DORA D'ISTRIA. See GHIKA HELENA, *ante*.

DORAK', a t. of Persia, in the province of Khuzistan, situated on a marshy plain at the junction of the D. with the Jerrahi. It is surrounded by a mud-wall, and defended by a fort. By a canal which unites the D. with the river Karun, a considerable trade is carried on. D. is also reported to have thriving manufactures. Pop. 6,000.

DORAN, JOHN, PH.D., a copious contributor to miscellaneous literature, descended from an old Irish family of Drogheda, was b. in London in 1807. In early life he resided in France and Germany, and was chiefly educated by his father. So early as 1822, he produced the melodrama of *The Wandering Jew*, and at the age of 20 became the editor of the *Literary Chronicle*. In 1835, he wrote a history of Reading, but from that time till 1854, he confined his labors to the periodical press. In the latter year he published *Habits and Men*, followed by *Table Traits and Something on them*. *Lives of the Queens of England of the House of Hanover* appeared in 1855; *Knights and their Days*, in 1856; *Monarchs retired from Business*, in 1857; *History of Court Fools*, in 1858; *New Pictures and Old Panels*, in 1859; *The Princes of Wales*, in 1860; and a *Memoir of Queen Adelaide*, in 1861. In 1864, he produced *Their Majesties' Servants*, a history of the stage from Betterton to Kean; in 1868, *Saints and Sinners;* and in 1873, his most interesting work, an account of Mrs. Montague and the "blue stockings" of her day, under the title of *A Lady of Last Century*. In 1876, he published *Mann and Manners*, the letters of sir Horace Mann to Horace Walpole. His last work, *London in Jacobite Times*, appeared in 1877. Besides being a large contributor to miscellaneous literature, Dr. D. several times edited the *Athenæum*, and at his death, 25th Jan., 1878, he was editor of *Notes and Queries*.

DORCAS SOCIETY, the name given to an association of ladies who supply clothes to necessitous families. The name is taken from Acts ix. 39: "And all the widows stood by him weeping, and shewing the coats and garments which Dorcas made, while she was with them."

DORCHESTER, a co. in s.e. Maryland, on Delaware and Chesapeake bays, intersected by the Delaware and Dorchester railroad; 640 sq.m.; pop. '70, 19,458—7,556 colored. Productions, wheat, corn, etc. Co. seat, Cambridge.

DORCHESTER, a co. in Canada, bordering on Maine, and drained in part by Chaudière river. Pop. '71, 17,779.

DORCHESTER, a parliamentary and municipal borough, the co. town of Dorsetshire. It has a considerable trade in ale and beer, and sends much butter to London. Pop. '71, 6,915. It sends one member to parliament. D. was the Roman *Durnovaria* or *Durinum*, a walled town with a fosse, and a chief Roman British station. Parts of the wall, 6 ft. thick, remained till 1802. Near D. are the remains of the most perfect Roman amphitheater in England, 218 by 163 ft., and 30 ft. deep, the seats rising from the arena, cut in the chalk, and capable of holding 13,000 spectators. There is also a Roman camp with a ditch and high vallum. Near D. is a large British station with three earthen ramparts, a mile and a half in circuit, and pierced by intricate passages, and inclosing barrows. The inner rampart is 60 ft. high. Here, in 1685, judge Jeffreys, in his "bloody assize," sentenced to death, in two days, 109 persons implicated in Monmouth's rebellion.

DORCHESTER, formerly accounted a separate city of Massachusetts, U. S., was in 1870 annexed to the city of Boston. The fortification of Dorchester heights, in 1776, compelled the evacuation of Boston.

DORCHESTER (*ante*), formerly a t. in Norfolk co., Mass., but now the 16th ward of the city of Boston; pop. '75, 15,788. The locality was settled by Puritans from Dorchester, Eng., under the lead of the Rev. John White, who landed at Nantasket, June 11, 1630. The codfishery, so important to New England, originated in Dorchester, and there was erected the first mill in America driven by water-power. Large portions of this district are exceedingly attractive, with beautiful suburban residences.

DORDOGNE, a river rising in s. central France, running w. through the departments of Corrèze, Lot, and Dordogne, and falling into the Garonne, 13 m. n. of Bordeaux; about 220 m. long, and navigable for 150 miles.

DORDOGNE, a department in the s.w. of France, formed of the ancient province of Périgord, with small portions of Limousin, Angoumois, and Saintonge. Area, 3,531 sq.m. Pop. '76, 489,848. The surface is for the most part hilly, and covered with broom and underwood, with here and there a valley of extraordinary beauty and fertility, inclosed with hills, the sides of which are generally clothed with vineyards. There is a great deficiency of corn, but the want, as an article of food for the inhabitants, is supplied to some extent by the immense produce of the chestnuts, which, with the walnut and the oak, are the prevailing trees in the forests. The climate is generally mild. Mines of coal, iron, and manganese are worked; marble, alabaster, and millstones are quarried. The manufactures are coarse woolens, hosiery, brandy, oil, paper, etc. D. carries on considerable trade in iron, wine, hams, and truffled turkeys. It has five arrondissements—viz., Bergerac, Nontron, Périgueux, Ribérac, and Sarlat, with Périgueux as capital.

DORDRECHT. See DORT.

DORÉ, PAUL GUSTAVE, a French artist of great and versatile power, was b. at Strasburg in 1832. He was educated at Paris, and very early gave indication of superior ability. His first attempts were sketches, contributed to the *Journal pour Rire* and others of the Paris periodicals. In 1855, he exhibited his picture of the "Battle of the

Alma," which was followed by the "Battle of Inkerman" in 1857. In this year he first became heard of in England by the reissue of his illustrations of the legend of the "Wandering Jew," the power of weird and grotesque imagination displayed in which could not fail to arrest attention. The success of this work might seem to have determined the future career of the artist, who has since chiefly worked as an illustrator. His productiveness in this field is amazing. He has illustrated editions of *Rabelais*, of the *Contes Drolatiques* of De Balzac, of Dante's *Divina Commedia*, of *Don Quixote*, of Lafontaine's *Fables*, of Milton, and of the Bible—all of which bear the impress of D.'s original genius. He has has also illustrated Tennyson's works, Coleridge's *Ancient Mariner*, the *Legend of the Wandering Jew*, and a tour in Valencia, besides executing a vast mass of miscellaneous work. He has from time to time reproduced and exhibited in Paris and London many of his designs. The "Dore Gallery," used for this purpose, has been open in London for several years. "Christ leaving the Prætorium" is his most important painting. The slightest of D.'s productions shows that he is at once artist and poet, and excites a greater interest than many works more free from hastiness and mannerism. In 1861, D. received the decoration of the legion of honor.

DO'RIA, ANDREA, a noble Genoese, and one of the greatest admirals of his age, was b. at Oneglia in 1468. At an early age, he took service in the guard of the pope, Innocent VIII., and afterwards distinguished himself in the battles which the Milanese and the French fought against Genoa and the kings of Aragon. It was D. who, in 1503, after a short campaign, crushed the rebellion in Corsica. When Genoa, in 1513, got rid of the French domination, D. was appointed capt.gen. of the galleys, in which capacity he carried on a war of extermination against the dangerous swarms of African pirates who infested the Mediterranean. During the war between Francis I., king of France, and Charles V., emperor of Germany, and king of Spain, D. commanded the French fleet, reinforced by his own galleys, and inflicted everywhere severe losses upon the enemy. After the defeat of Francis I. near Pavia, D. accepted the command of the papal fleet; but upon the return of the king from his captivity, entered once more the French service, with the title of high-admiral of the Levant. He blockaded Genoa, for having espoused the cause of the emperor, and putting to flight the party of the Adorni, took the town. On finding the independence of his country threatened by the French, D. with his whole force went over to the emperor, and by so doing hastened the deliverance of Italy from French domination. In 1529, D. entered Genoa without resistance, and refusing the title of sovereign, which was offered by the emperor, established there a popular form of government, which remained in vigor up to the end of the republic. The grateful country decreed him the title of "Father of Peace;" and the emperor, in whose service D. continued, conferred upon him the order of the golden fleece, together with the principality of Melfi. In 1532, D. won a decisive victory over the Turks near Patras, and the conquest of Tunis (1535) was chiefly his work. He took part in the joint expedition against the Turks under Barbarossa in 1539, and in another against Algiers in 1541, where he lost 11 of his own galleys. The tranquillity of his last years was disturbed by the conspiracy of Fieschi. D. took fierce revenge upon the conspirators for the death of his nephew Gianettino. D. died without offspring, in 1560, at Genoa, in his 93d year.

DO'RIANS, one of the four principal peoples of Greece, who took their name, according to the legend, from Dorus, the son of Hellen, who settled in Doris; but Herodotus says that in the time of king Deucalion they inhabited the district Phthiotis; and in the time of Dorus, the son of Hellen, the country called Histiæotis, at the foot of Ossa and Olympus. But the statement of Apollodorus is more probable, according to which they would appear to have occupied the whole country along the northern shore of the Corinthian gulf. Indeed, Doris proper was far too small and insignificant a district to furnish a sufficient number of men for a victorious invasion of the Peloponnesus. In this remarkable achievement they were conjoined with the Heracleidæ, and ruled in Sparta. Doric colonies were then founded in Italy, Sicily, and Asia Minor. Strikingly as all the four nations of Greece differed from each other in language, manners, and form of government, the D. in particular differed from the Ionians. The former preserved a certain primitive solidity and earnestness, but with it something coarse and hard. See O. Müller's *Die Dorier* (2 vols., Breslau, 1824; 2d ed. 3 vols, 1844). The *Doric dialect* bore the same character; it was harsh and rough, while the Ionian was soft and polished, yet the former had something venerable from its antiquity, and was therefore employed in hymns and choruses. In philosophy, the influence of the Doric character was particularly visible in the Pythagorean school and its attachment to the aristocracy. It is no less traceable in architecture in the the strong unadorned Doric pillars, which form so marked a contrast to the slender and decorated Ionian columns.

DOR'IC ORDER. The oldest, strongest, and simplest of the three orders of Greek architecture. See COLUMN, ENTABLATURE, GREEK ARCHITECTURE.

DO'RIS, a genus of gasteropodous mollusks of the order *nudibranchiata*, the type of a family called *doridæ*, and sometimes popularly SEA-LEMONS. The body is oval, the abdomen flat, the back flat in some and elevated in others, the mouth a small proboscis with two small tentacula, the vent situated in the back, and surrounded by a

circle of branched or plumed gills. The species are found in all seas, many in those of Britain; but they are more numerous in the southern hemisphere. Some of them attain a considerable size. Few of them inhabit deep water. They crawl on rocks, sea-weeds, etc., where they are often left by the tide, or swim in a reversed position; the foot, made concave by muscular action, serving to buoy them up. Some of them are pretty and interesting inmates of the aquarium. Gosse mentions, that specimens of *D. bilamellata* were "very social in confinement, continually finding out one another, and crawling close up together."—*A Naturalist's Rambles on the Devonshire Coast.*

DORIS, a small mountainous district of ancient Hellas, between Phocis, Ætolia, Locris, and Thessalia, was the earliest home of the Dorians. With its four towns, Boium, Cytinium, Erineus, and Pindus, it formed the Doric Tetrapolis, which was afterwards completely destroyed by the Macedonians, Ætolians, and other nations, so that at the time of the Romans, only a few remains of these towns were visible.—D. was also the name of a district in Asia Minor, on the coasts of Caria, inhabited by colonists from the Peloponnesus; it formed a *hexapolis.*—In modern Greece, D. forms an eparchy of the government of Phocis.

DORKING, or DARKING, a t. in England, in the middle of Surrey, stands in a picturesque valley on the left bank of the Mole, 23 m. s.w. of London by road. It lies on the Roman road which ran between London and Chichester. Pop. '71, 5,419. Its chief trade is in flour, lime, and chalk from the adjacent pits. D. gives its name to a peculiar breed of domestic foul. See POULTRY.

DORMANT (Fr. sleeping). In heraldic representation, an animal dormant has its head resting on its forepaws, whereas an animal couchant has its head erect.

DORMANT VITALITY is a term used to designate a peculiar condition which is manifested by many organized beings, and which is characterized by an apparent suspension of all the vital actions. Beings in this state can scarcely be said to be *alive*, since they exhibit no vital activity, nor can they be designated as *dead*, since that implies their incapability of resuming their former state; hence, since they retain their peculiar attributes without manifesting them, the term D. V. seems the most appropriate for them. This condition may result either from the withdrawal of the stimuli necessary for the maintenance of vital actions (as water, heat, etc.), or it may proceed from some change in the organism itself, whereby its power of responding to these stimuli is for a time diminished or lost. We shall illustrate our meaning by a few striking examples of each kind of dormant vitality.

1. D. V. from the withdrawal of the necessary stimuli.

Seeds deprived of access to air and moisture may retain their vitality for an enormous time. "I have now before me," says Dr. Lindley, "three plants of raspberries which have been raised in the gardens of the horticultural society, from seeds taken from the stomach of a man whose skeleton was found 30 ft. below the surface of the earth, at the bottom of a barrow that was opened near Dorchester. He had been buried with some coins of the emperor Hadrian, and it is probable, therefore, that the seeds were 1600 or 1700 years old." A more remarkable illustration of the vitality of seeds is afforded by a case communicated to Dr. Carpenter, and published in his *General and Comparative Physiology* the facts of which may be shortly stated as follows: In a town in the state of Maine, about 40 m. from the sea, a well was being dug, and at a depth of about 20 ft. a stratum of sand was found, which excited interest, from the circumstance that no similar sand was known to exist nearer than the sea-beach. It was, in the first instance, collected in a heap, but was subsequently scattered about the spot on which the heap had stood. In a year or two, when the very existence of the sand was almost forgotten, it was observed that a large number of small trees were growing up on the ground where it had been strewed. They turned out to be beach plum-trees, and they actually bore the beach-plum, which had never before been seen except immediately upon the sea-shore. These trees had therefore sprung up from seeds which were in the stratum of sea-sand that had been pierced by the well-diggers, and had probably retained their vitality through a period of time beyond the estimation of human calculation—the period, namely, in which the sea had gradually receded 40 m. from its present limits.

Among the lower animals, we find several of comparatively complex structure, in which D. V. can be induced for a considerable period, as, for instance, several years by the abstraction of their *moisture.* The well-known rotifer, the wheel-animalcule, may be reduced to a state of perfect dryness, and kept in this condition for a great length of time (certainly three or four years, and some writers say far longer) without evincing a sign of life, and yet it will immediately revive on being moistened. The *tardigrades,* an allied tribe, have been desiccated by the most powerful means which chemistry affords, and have been then heated to a temperature of 250°, and have still been revived by water, although in their active state a temperature of 120° destroys them. In Woodward's *Manual of the Mollusca,* cases are recorded of living snails crawling out of shells which were supposed to be empty, and in which they must have been dormant for several years, and the eggs of snails and others of the lower animals have a still greater power of revivification after drying. Sir James Emerson Tennent describes various fishes in Ceylon which bury themselves in the mud when the pools or tanks dry up, and remain torpid until the periodic rains of that country ensue, and previous observers

had noted similar facts in other tropical countries. Humboldt relates that crocodiles and boas are sometimes found alive, though torpid, in hardened mud, and revive on the application of water.

A *diminution of temperature* will induce this phenomenon in many animals. In one of capt. sir James Ross' voyages, several caterpillars having been exposed to a temperature of 40° *below zero*, froze so completely that, when thrown in a tumbler, they chinked like lumps of ice. When thawed, they resumed their movements, took food, and became transformed into the chrysalis state. One of them, which had been frozen and thawed four times, subsequently became a moth. In the North American lakes, frozen fishes are often found in the ice, which revive when gently thawed. Spallanzani kept frogs and snakes in a torpid state for three years in an ice-house, and then revived them by warmth. The same capability does not exist, at all events to the same extent, in the warm-blooded animals. A *total* suspension of vital activity in a bird or a mammal for any length of time, from the prolonged application of severe cold, or from any other cause, is never followed by recovery. The stories of certain birds burying themselves in the mud during winter, are regarded by the best authorities as more than questionable; and in hibernating mammals (see HIBERNATION), the suspension is not total. How we are to explain, or whether we ought to believe, the remarkable cases of certain Indian fakirs, who are stated to have the power of suspending all their vital activity for days, or even weeks, we do not know. The late Mr. Braid, of Manchester, published a collection of these cases, directly obtained from British officers who had been eye-witnesses of them in India, in his *Observations on Trance or Human Hibernation*, 1850. We quote one of these, vouched for by sir Claude Wade. The fakir was buried in an underground cell, under strict guardianship, for *six weeks;* the body had been twice dug up by Runjeet Singh (at whose court the exhibition came off) during the period of interment, and had been found in the same position as when first buried. In this and in all the other recorded cases, the appearance of the body when first disinterred is described as quite corpse-like, and no pulsation could be detected at the heart or in the arteries. The means of restoration employed were chiefly warmth to the vertex, and friction to the body and limbs.

2. Dormant vitality from changes within the organism.

The insect world affords us the chief illustrations of this variety of dormant vitality. The pupa or chrysalis stage of insect life is in itself one of dormant vitality, unconnected with any of the external influences which we have been describing. That this stage may be much shortened by artificial heat, and prolonged by artificial cold, has been known since the time of Reaumur; but, as the following case shows, there are other causes inherent in the animal itself, which tend at a certain time to prolong the pupa condition. In the *papilio machaon* there are two generations every year; for the butterfly that comes forth in the early summer lays eggs which rapidly pass through all the phases of insect life, and produce another set of eggs later in the season, whose *larvæ* or caterpillars turn into *pupæ* before the winter. The pupa stage of the first brood (in July) lasts only 13 days, while that of the second brood (which commences in Sept.) lasts 9 or 10 months, the butterfly not appearing until the following June. The difference of temperature is obviously quite insufficient to account for the great diversity between the two periods. Several other similar cases may be found in Kirby and Spence's *Entomology*.

DORMER, or DORMER WINDOW, is a window placed in a small gable rising out of a sloping roof, often made use of for the purpose of enlarging and lighting the attic or garret-rooms of modern houses. It is also popularly known as a storm-window. *Dormers* do not appear to have been invented before the middle of the 14th century.

DORMITORY (Fr. *dormitoire*, from Lat. *dormire*, to sleep), a sleeping apartment in a monastery, or other religious establishment. Dormitories are usually of considerable size, sometimes having a range of cells parted off on each side.

DORMOUSE, *Myoxis*, a genus of rodent quadrupeds, ranked by some naturalists in the family *muridæ* (rats, mice, etc.), and by others in the family *sciuridæ* (squirrels, etc.), being, in fact, a connecting link between the one family and the other. Their habits resemble those of squirrels; the dentition, however, more nearly agrees with that of mice. There are four molar teeth on each side in each jaw: the upper jaw has not the anterior rudimentary fifth molar, characteristic of squirrels. The molars have their summits marked by transverse ridges. There are no cheek-pouches. The ears resemble those of mice. The fore-paws have each 4 toes and a rudimentary thumb; the hind-feet have 5 toes. The fur is very fine and soft. The tail is long, and in the different species exhibits characters variously intermediate between those of mice and squirrels. This genus and the closely allied genus *graphyurus* are remarkable as the only genera of rodents in which there is no cæcum. The species of D. are beautiful little animals, natives chiefly of the s. of Europe. Some species are also found in Africa, and the genus *graphyurus* is entirely African. The only British species of D. is the COMMON D., RED D., or MUSCARDINE (*M. avellanarius*), an inhabitant of woods in some parts of England. It is about the size of a common mouse, with head proportionally large; has a rather pointed muzzle, large prominent eyes, and a flattened tail, thickly clothed with rather long hair; and is of a tawny red color on the upper parts, and white beneath.

It is extremely gentle and easily tamed, feeds on beechmast, acorns, hazel-nuts, grain, etc., and spends the colder parts of winter in a state of torpidity, although in mild weather it wakens up to consume a little of the store of food which, like squirrels, it lays up for that season. Before its hibernation begins, it is generally very fat, nor does it become emaciated by hibernating. It makes a nest of tangled or interlaced herbage opening from above, usually in copse or underwood; and produces about 4 young ones at a birth. It often assumes a remarkable posture in feeding, suspending itself by its hind-feet; more generally it sits upon its haunches, and holds its food in its fore-paws. This species is found in all parts of continental Europe, from the Mediterranean to Sweden.—The FAT D. (*M. glis*) is a larger species, grayish brown, about the size of a rat, with tail very like that of a squirrel, a native of the s. of Europe, where it inhabits forests, leaping from branch to branch with great agility. It is eaten by the Italians, as it was by the ancient Romans, who highly esteemed it, and fattened it for the table in receptacles called *glirария*.—The GARDEN D. (*M. nitela*), common in Europe as far n. as Poland, is frequently found in gardens, and even in outhouses. It is often very destructive of the fruit of wall and espalier trees. It is rather smaller than the fat D., grayish brown, black round the eyes, and has the tail tufted only at the extremity. All the species of D. hibernate; and from this circumstance the name seems to be derived (Lat. *dormio*, to sleep).

DORNBIRN, a t. of Austria, in the n.w. of Tyrol, about 8 m. s. of the eastern extremity of the lake of Constance, is situated on the Lossen, a small mountain stream. The houses are widely scattered. The women of D. are chiefly employed in muslin-embroidery; the men are for the most part carpenters, and are principally engaged in the construction of wooden houses, which are carried in detached pieces to the market-town (Bregenz), and are thence exported. Pop. '69, 8,486.

DORNER, ISAAK AUGUST, D.D., b Würtemberg, 1809; son of a Lutheran minister; studied at Tübingen, and a professor there in 1838. Soon afterwards he was professor of divinity and councilor of the consistory at Königsberg. From 1847 to 1853, he held a chair at Bonn, then removed to Göttingen; and in 1863, was appointed professor of systematic theology and exegesis in the university of Berlin. His best known work is the *History of the Development of the Doctrine of the Personality of Christ.* This and others of his works have been published in English.

DORNICK, DORNIC, DORNOCK, a species of figured linen, for a full description of which see Ure's *Dict. of Arts and Manufactures.* Dornicks were formerly made in considerable quantity at Dornich, or Tournay, in the Netherlands, and hence their name. From this place, the manufacture was probably carried to Norfolk by the Dutch, who emigrated thither during the persecution of the duke of Alva. By a statute, 5 and 6 Ed. VI. c. 24, this manufacture, or "mystery," carried on at Norwich, is carefully protected. All persons except those residing in Norwich or Pulham, are forbidden to carry on the "mystery," under pain of forfeiture of the article, and of the sum of 6*s.* 8*d.* for every six yards so made. By 4 Will. and Mary, c. 5, s. 2 (68), a duty of 10 per cent, in addition to duties previously levied, is laid on all tapestry or dornicks imported, except from France. It is scarcely necessary to add, that these stringent provisions are no longer in observance.

DORNOCH, a royal burgh and co. t. of Sutherlandshire, situated near the entrance to the DORNOCH FIRTH—an inlet of the North sea, running 25 m. inland, and separating Sutherland from Ross-shire. The cathedral stands in the center of the town, and is an object of considerable attraction. It is said to have been begun in the 11th c. by St. Bar, and was enlarged in 1270 by bishop Gilbert Murray. It was burned in 1570, and thereafter partially repaired. In the year 1837, it was to a certain extent restored by the late duchess of Sutherland. It is in the shape of a cross, and is surmounted with a tower and clock spire. The interior is fitted up and used as the parish church. D. was, in olden times, the residence of the bishops of Sutherland and Caithness. The west tower of the bishop's palace stands immediately opposite to the cathedral. Next to it is a handsome building, in the old English style of architecture, for the courts of law and public offices. The town has a neat, clean appearance, and is lighted with gas. It is considered one of the best bathing-places in the north, and has extensive "links," fit for archery, golfing, and other exercises. D. is one of the six northern burghs which send a member to the house of commons. It was constituted a royal burgh by Charles I. in 1628. The last victim in Scotland to the laws against witchcraft was burned here in 1722. Pop. '71, 625.

DOROGH, a t. of Hungary, 20 m. n.n.w. from Debreczin, situated in the midst of a very fertile district. The pop., 8,222 in number, are chiefly engaged in agricultural pursuits.

DOROGOBUSH, or DOROGOBOUGE, a t. of Russia, in the government of Smolensk, is situated on the left bank of the Dnieper, about 50 m. e.n.e. of Smolensk. It is a small town, but pretty, and well built, and has some manufactures. Pop. '67, 7,865. At D., the French under Eugene, in their retreat from Moscow, encountered many disasters.

DOROGO'I, or DOROHOY, a t. in Roumania in the n. part of Moldavia, 80 m. n.w. of Jassy, on the Shiska; pop. 10,000. It has a large transit trade, and several important annual fairs.

DOROSMA, a t. of central Hungary, Little Cumania, 6 m. w.n.w. of Szeged. It contains a Roman Catholic high school. Pop. '69, 9,688.

DORP, a t. in Prussia, in the government of Dusseldorf, 17 m. n.e. of Cologne; pop. '72, 10,690. It has recently grown to importance for manufactures of iron, steel, paper, tobacco, etc.

DORPAT, or DERPT (Russian, *Gurlev;* Esthonian, *Tartolin*), a t. of Russia, in the government of Livonia, is situated on the Embach, here crossed by a fine granite bridge, 150 m. n.e. of Riga, and is built in the form of a semicircle. It consists of a town proper, with two suburbs. Its streets are straight and clean; its houses, which are mostly of one story, are built of brick or wood, have handsome fronts, and are often showily painted. It is the winter residence of the Livonian nobles and gentry. The Domberg hill, at the n.w. extremity of the town, is tastefully laid out in avenues and promenades; its summit, formerly the site of a cathedral, destroyed by fire in 1775, is now occupied by an observatory, the university library, schools of anatomy and natural history, museums, etc. The observatory—one of the most renowned in Europe, and long presided over by the celebrated Struve—possesses a great refracting telescope, presented by the emperor Alexander I. The university, founded in 1632 by Gustavus Adolphus, suppressed in 1656 by the Muscovites, and re-established by Alexander I. in 1802, is also famous. It supports a staff of about 70 professors and lecturers, and is attended by between 800 and 900 students, of every religious denomination, who are taught theology, ethics, law, medicine, natural philosophy, and natural history. German is employed, except for law. It is also the chief school of the Protestant clergy in Russia, and the Reformed synod of Wilna send their students hither. D. has a botanical garden, containing 18,000 plants, some of which cannot be obtained in any other botanical garden in Europe. D. was formerly a walled town, and the ramparts still exist, but have been converted into public walks. The chief employment of the people consists in supplying the wants of those connected with the university. Pop. '67, 20,780.

DORR, THOMAS WILSON, 1805–54; b. R. I.; graduate of Harvard, 1823. He was the leader of a party in 1840–41 whose object was to extend the right of suffrage in Rhode Island, it being much restricted by property qualifications, and otherwise. This party framed a new constitution, which was voted on, Dec., 1841, when it was claimed that a clear majority of the male citizens of the state voted for its adoption. In April, 1842, an election for state officers under this constitution was held, and Dorr was chosen governor. In May the new government undertook to organize and assume full power. They were resisted by the regular state government, and made some show of using force, but there was no actual fighting. Before the close of the month the Dorrites were scattered, and their leader was arrested, tried for treason, and sentenced to imprisonment for life, June 25, 1844. In 1847, he was released under an act of general amnesty, and in 1851, was restored to civil and political rights.

DORRE ISLAND, lying to the n. of Dirk-Hartog island (q.v.), in lat. 25° 10′ s., forms, like its southern neighbor, part of the breast-work of Shark bay, in western Australia. It is 20 m. long.

D'ORSAY, ALFRED GUILLAUME GABRIEL, Count, 1798-1852; a famous leader of society in London and Paris, who was not only the beau ideal of social elegance, but a man of universal intellectual and artistic gifts. Through his mother, by a morganatic marriage, he was a grandson of the king of Würtemberg. When young he served in the French army, and in 1822, while stationed at Valence, on the Rhone, he made the acquaintance of the earl of Blessington and his family, an event which affected the course of his after life. In Dec., 1827, he married lady Harriet Gardner, 15 years of age, the daughter of the earl of Blessington by his first wife. The union was not happy, and was dissolved soon after Blessington's death in 1829. The widowed countess was accompanied to England by D'Orsay, and the two lived in the same house, their residence becoming a resort of the fashionable artistic and literary society of London. The count's charming manner, brilliant wit, and artistic faculty were accompanied by benevolent moral qualities which endeared him to all his associates. He was always a Bonapartist, and naturally hastened to Paris in 1849, all the more readily because his home in London had been broken up through bankruptcy. The countess went with him, but died a few weeks after their arrival. He then endeavored to support himself by painting portraits. Only a few before days his death he was appointed director of fine arts.

DORSE (*Gadus callarias*, or *Morrhua callarias*), a fish of the same genus with the cod, haddock, etc.; plentiful in the Baltic and in other northern seas, but scarcely known on the coasts of Britain. It never attains so great a size as the cod, being seldom more than 2 ft. in length, but much resembles it in form and color, although its color is more variable, from which it has received the name of VARIABLE COD. It is also called the BALTIC COD. It differs from the cod in the greater length of the upper

jaw. It enters the mouth of large rivers. It is in great request on the coasts of the Baltic, being esteemed the best fish of all this family.

DORSET, EARL OF. See SACKVILLE.

DORSETSHIRE, or DORSET, a maritime co. in the s. of England, on the English channel, between Devonshire and Hampshire. Its greatest length is 58 m.; greatest breadth, 40; average, 21; area, 627,265 acres; a third being arable, a ninth waste, and the rest in pasture. The coast-line is 75 m. long, with some cliffs and headlands. St. Alban's Head is 344 ft. high. Portland isle (q.v.) is connected with the mainland by a remarkable formation known as Chesil bank. The surface is uneven and bleak. Chalk downs run along the s. coast, and through the middle of the county nearly from e. to west. The highest point is Pillesden Pen, 934 feet. The chief rivers are the Stour and the Frome. Geologically, D. consists of strata of plastic clay, chalk, oolite, lias, with some weald and greensand. Remains of colossal reptiles have been found at Lyme Regis. The chief mineral productions are the celebrated Purbeck and Portland building-stones, coarse marble, and white china and pipe clays. The climate is mild. The chalk hills or downs are covered with short, fine pasture, on which countless numbers of South-down sheep are fed. The soil is chiefly sand, gravel, clay, and chalk. D. is mainly a pastoral county, producing sheep, cattle, cheese, and butter; but some wheat, barley, hemp, linseed, hops, etc., are raised. Sanfoin is grown on the chalk hills. There are small manufactures of linen, silk, woolens, flax, hemp, buttons, stockings, and ale and cider. D. is divided into 12 poor-law unions, and about 290 parishes. The chief towns are Dorchester, Brideport, Poole, Weymouth and Melcombe Regis, Shaftesbury, and Wareham. D. sends 10 members to parliament, 3 for the county, and 7 for the above towns. Pop., '71, 195,537. The London and Southwestern, and Somerset and Dorset railways run through the chief districts. D. has ancient British and Roman remains, as stone circles, cromlechs, barrows, camps and amphitheater, and 3 Roman stations. There are some remains of 40 abbacies, priories, hospitals, etc. The ruins of Corfe castle, a seat of the Saxon kings of Wessex, are among the grandest in England.

DORSEY, JOHN SYNG, 1783–1818; b. Philadelphia; studied medicine with Dr. Physick, and first became noted as a physician to a yellow-fever hospital. He was a highly accomplished surgeon, and author of *Elements of Surgery* and of various papers on medical subjects.

DORSIBRANCHIATES, worms living in mud or sand, or swimming in the sea, whose respiratory organs are in the form of tufts or branchial appendages along the back or sides. One species, the lob-worm, is greatly prized in Europe for fish bait. The eunice, another species, has been known to reach the length of 4 feet.

DORSTE'NIA. See CONTRAYERVA.

DORT, or DORDRECHT, a t. of the Netherlands, in the province of South Holland, situated on an island formed by the Maas, about 12 m. s.e. of Rotterdam. An inundation in 1421, in which upwards of 70 villages were destroyed and 100,000 people drowned, separated the site upon which D. stands from the mainland. D. is fortified on the s. side, and its position is naturally so strong, that though frequently besieged, it has never been taken. It is one of the oldest towns in Holland, and some interesting historical particulars attach to it. Here, in 1572, the states of Holland, after their revolt from Spain, held their first assembly, and declared the prince of Orange to be the only lawful governor of the country. In 1718–19, the conclave of Protestant divines known as the synod of Dort, met here and condemned the doctrines of Arminius as heretical, and affirmed those of Calvin. (For an account of the questions at issue, see ARMINIUS.) The Gothic buildings in which the synod sat, whose miraculous labors, according to the president's closing address, "made hell tremble," is now used as a public-house, and the particular room in which they met is degraded into a dancing-saloon. Among the principal buildings of D. are a Gothic church with a tall square tower, and containing a beautiful marble pulpit, and the town-hall. The town is traversed by canals, and the Rhine and the Maas afford it great facilities for trade. Large ships can go quite up to the quays. Gigantic wood-rafts, valuing sometimes as much as £30,000 each, obtained from the Black forest and Switzerland, come down the Rhine to D., which has numerous saw-mills; ship-building docks, salt and sugar refineries, bleacheries, and manufactures of tobacco, white-lead, etc. It has also considerable trade in corn, flax, oil, timber, and salt-fish. Pop. '74, 25,823.

DORTMUND, the most important t. of Westphalia, on the Cologne and Minden railway, is situated on the Emscher, 47 m. n.n.e. of Cologne. It is the center of a mining district, with numerous foundries, and the head-quarters of the mining authorities of Westphalia. D. was formerly surrounded by massive walls, but the greater part of these have been removed, and the town is now quite modern in its aspect. Its history goes back into the earliest middle-age traditions, figuring in the time of Charlemagne under the names of Throtmanni, Tremonia, Trotmunde, and Dortmunde. Subsequently it became a free Hanse town, but was ceded to Prussia in 1815, at the congress of Vienna. The town-hall of D. is one of the oldest in Germany. D. is an important railway center, and manufactures railway material on a large scale. Coal and iron are wrought in the neighborhood; and in D. are nearly 50 beer-breweries. Pop. '75, 57,742.

DORY, *Zeus*, a genus of fishes, the type of a family, *zeïdæ*, which is sometimes regarded as merely a group of the great family of *scomberidæ*, but is at least a very distinct group, characterized not only by an oval and much compressed form of body, but also by a protractile mouth. The teeth are feeble. The species of *zeïdæ* are distributed in the seas of all parts of the world, although only three occur on the British coasts, and two of these are very rare (see BOAR-FISH and OPAH). In the D. genus, the general surface of the body is smooth and destitute of scales, but spiny scales or bony shields guard the dorsal and ventral edges. The anterior portions of the dorsal and anal fins are spiny, and are very distinctly separated from the spineless portions; the spines of the dorsal fin are prolonged into long filaments, and the tail-fin is rounded. The British species (*zeus faber*), popularly known as the JOHN DORY, sometimes attains a considerable size: Pennant mentions one which weighed 12 lbs.; but it is seldom seen of much more than 18 in. in length. It is principally found on the southern, and particularly the south-western coasts of England, visiting them, apparently, in pursuit of pilchards; but becomes more rare towards the north. It is highly esteemed for the table, having among modern epicures pretty much the same reputation which it had among those of ancient Rome. It is common in the Mediterranean. The name D. is generally supposed to be properly *dorée* (gilt), and to refer to the prevailing yellowish color and golden luster of the fish; whilst the familiar appellation, *John*, is in like manner derived from *jaune* (yellow), although it has been suggested that it may rather be from the Gascon *jau*, a cock—names signifying cock, sea-chicken, St. Peter's cock, etc., being given to this fish in different languages. The D. has a remarkable dark spot on each side. An idle legend refers these spots to the finger and thumb of St. Peter, and the D. thus disputes with the haddock the honor of being reputed the fish from whose mouth he took the tribute-money. Other species of D., very similar to the European, are found in the seas of other parts of the world—one of them Australian, exhibiting similar dark spots.

DOSITH'EANS, named after their founder Dositheus, who was a companion of Simon Magus, in the 1st c. A.D. Various stories are told of Dositheus; that he claimed to be the Messiah, and that after the death of John the Baptist, he assumed to take the place of that leader. The Samaritan high-priest ordered his arrest, when he took refuge in a cave, and is said to have starved to death.

DO'TIS, or TOTIS, a t. in the n.w. of Hungary, district of Komorn, and 37 m. w.n.w. of Pesth. Between the town proper and its suburb, called *Lake Town*, from its situation on a small lake, are the remains of an old castle, said to have been a favorite residence of Mathias Corvinus, the Hungarian king. D. contains a splendid château, the property of the Esterhàzy family, the gardens adjoining which are laid out in the English fashion. Pertaining to this castle are some very extensive wine-vaults, one of them containing a tun capable of holding 34,700 English gallons. Pop. '69, 9,855.

DOT'TEREL, *Charadrius morinellus*, a species of plover (q.v.), which in summer inhabits the northern parts of Europe and Asia, breeding chiefly in the highest latitudes, and migrates on the approach of winter to the countries around the Mediterranean and those of similar climate. It appears in Britain as a bird of passage, both on its northward migration in spring, and on its southward migration in autumn. Some breed in the mountains both of Scotland and of England, always at very considerable elevations. The D. is about nine inches and a half in its whole length. In summer plumage, the upper parts are of a brownish ash color, the feathers edged with deep red; the cheeks, throat, and a band above the eyes, white; the breast bright rust color, with a white gorget on the upper part of it, bounded above by a blackish line; a conspicuous black patch on the middle of the belly; some of the tail-feathers tipped with white. The D. has become proverbial for stupidity; but the readiness with which it allows itself to be approached seems to be entirely owing to its coming from regions little frequented by man, and it becomes shy and watchful after a little experience. It is much esteemed for the table, and well known in the London market.

DOUAI, or DOUAY, a t. of France, in the department of Nord, situated on the river Scarpe, about 20 m. s. of Lille. It is a dull, lifeless place, but is surrounded with walls, and is strongly fortified. The principal buildings are the churches, the Hotel de Ville, the public library, the museum, a hospital, and the old buildings of the English college. There are several good schools in D., and a great cannon-foundry. The manufactures include lace, tulle, cotton, oil, soap, brushes, iron machinery; and there is an active trade in corn, seed, and linen. Pop. '76, 23,348. D. has existed since Roman times. It was long a bone of contention between the Flemish counts and the French rulers. It passed with the rest of Flanders under the dominion of Spain, but was taken by Louis XIV. in 1667. Marlborough captured it in 1710, but the French re-occupied it after his withdrawal, and were finally confirmed in the possession of it by the peace of Utrecht.—The *English Catholic College* at D., long the sole or chief theological seminary for English-speaking Catholics, was founded by Dr. William (afterwards cardinal) Allen in 1568. By reason of political difficulties with the Spanish authorities, then in possession of the town, the college was transferred to Rheims in 1578; but in 1593, it was again established at D., and there it flourished till the French revolution, when it was broken up. Subsequently it was re-established on a smaller scale by the Benedictine fathers, and is still conducted by them.

DOUAY BIBLE. See BIBLE.

DOUAY, CHARLES ABEL, 1809–70; a native of France; graduate of the military academy of St. Cyr; served in the war in Algiers, and in the Crimea, where he was conspicuous in the attack on the Malakoff. For services in the battle of Solferino he was made gen. of division. In the German war he commanded at Weissenburg, where he was defeated by the crown prince Frederick William, and found dead on the battle-field.

DOUAY, FÉLIX CHARLES, 1818–79; brother of Charles Abel; served as a capt. in the siege of Rome in 1849, and in the Crimean war, where he rose to brig.gen. He was in Mexico with Maximilian, serving as gen. of division. In the Franco-German war, he led the 7th army corps, and was taken prisoner at Sedan. In Paris, he led the 4th army corps against the commune. He was the first to enter Paris, May 21, and saved the Louvre from entire destruction. His latest command was the military district of the Rhone.

DOUBLEDAY, ABNER, b. N. Y., 1819; graduate of West Point, and a civil engineer. In the Mexican war, he served in the artillery, and became capt. It is said that he fired the first gun on the union side in the war of the rebellion, at Fort Sumter, April 12, 1861. He served with honor through the war, and rose to be brevet maj.gen.

DOUBLE CONSCIOUSNESS. Double or divided consciousness has likewise been designated double personality. The term comprehends a group of morbid mental conditions involving some modification in the clearness of the idea of personal identity. Individuals are often encountered with confused notions of the "me" and "not me;" others conceive that parts or properties of their frame belong to another person, or that they are inhabited and ruled by a spirit or entity acting in opposition to their will and interests; and there are others who, at different times and under different circumstances, such as when influenced by, or free from moral or physical stimulation, conceive that they are different persons, and endowed with different qualities and powers. These manifestations, however, do not fully illustrate the state under consideration, which has been described as exhibiting, in some measure, two separate and independent trains of thought, and two independent mental capabilities in the same individual, each train of thought and each capability being wholly dissevered from the other, and the two states in which they respectively predominate, subject to frequent interchanges and alterations. In the most marked or perfect form of this phenomenon, the individual is conscious of the two independent trains of thought, and conceives, in consequence of the apparent independence of these, that he is two distinct persons at the same time. There are few instances of this mental affection on record (see Wigan *On Duality of Mind*, Abercrombie's *Inquiry into Intellectual Powers*, Ellicot in Combe's *System of Phrenology*, 3d edition). A servant-girl, at the period of puberty, gave evidence of double personality for three months. In an advanced stage of the affection, the circumstances which occurred during the paroxysm were completely forgotten by her when it was over, but were perfectly remembered during subsequent paroxysms. She was, for example, taken to church while in her abnormal state. She shed tears during the sermon, particularly during an account given of the execution of three young men, who had described, in their dying declarations, the dangerous steps with which their career of vice and infamy commenced. When she returned home, she recovered in a quarter of an hour, was quite amazed at the questions put to her about the sermon, and denied that she had been in church; but next night, when taken ill, she mentioned that she had been there, repeated the words of the text, and gave an accurate account of the tragical narrative of the three criminals by which her feelings had been so powerfully affected (*Philosophical Transactions*, Edin. 1822). This description assimilates the patient to the class of somnambulists. But such perversions of the faculties generally involve a more palpable and complete duality of mind. The personal identity seems to be lost or impaired. A. B. conceived that he was himself and another person at the same time; he acted as if this belief were sincere, and could not divest himself of the conviction that in his body were two minds or persons suggesting courses of conduct widely opposed. He was certain that his original self, A. B., was a base, abandoned scoundrel, tempting his other, or new, or better self—to whom, it should be noted, was attached the emphatic *Ego*—to commit crimes or acts of which he altogether disapproved. The second person in this duality repelled, struggled with these abominable solicitation, such as that he should commit suicide; and loathed the tempter or first person. This struggle sometimes became real and visible, when the hands, acting under the will of No. 2, or the virtuous and opposing principle, beat and bruised the legs, body, or head, which, it may be presumed, were supposed to belong to No. 1, the vicious or tempting impulse. The object of the one was obviously to inflict pain upon the other. The blows were so severe as to leave marks for days; and when these were adverted to, the answer was, as if from No. 2, "Don't justify him, he deserved it." Such conflicts generally occurred during the night, and the interference of the night-watch was required to part or pacify the combatants.* In this case the manifestations of disease might be attributed to the abstruse but vain philosophical inquiries of the mind during health.

* Fifth annual report, Crichton royal institution, 1844, p. 13.

While it is quite intelligible that habits of protracted self-analysis, or of that abstraction which loses all idea of distinct personality in the act of thinking, or in the subject occuyping attention, may induce such a condition, a more physical explanation has been sought in the alternate morbid activity of different parts of the brain, in the non-consentaneous or independent and alternate activity of the two hemispheres of the brain. which, when acting together, are held to be the organ of the mind in its unity and entireness. Latterly, the views of sir William Hamilton have been brought to bear upon the point; and still more recently, the theory called "unconscious cerebration," which supposes certain impressions to exist unperceived, and to become objects of consciousness only under certain conditions, has been applied to the same purpose; but, in so far as the impairment of the conviction of personal identity is concerned, the problem still awaits solution.

DOUBLE FLAT, a musical character used to lower the note before which it is placed two half-tones.

DOUBLE FLOWERS. See FLOWER.

DOUBLE REFRACTION. If a crystal of pure carbonate of lime, known as Iceland spar, be laid over a printed page, two distinct views of the letters will be seen through the transparent stone. The letters in the two images will have a fainter color than the original, except when the two images overlap. The production of two images in this manner is called double refraction. If the crystal is made to rotate while always in contact with the paper, one of the images of a dot will be seen to rotate, while one remains unmoved. The stationary image is called the ordinary, the moving one the extraordinary image. The rays which form the ordinary image follow the common law of refraction of light. The others have a different index of refraction. Other crystals besides Iceland spar are doubly refractive. For an elaborate demonstration of the causes of this effect, see Lloyd's *Wave Theory of Light*, London, 1873.

DOUBLE SHARP, a musical character the reverse of the double flat.

DOUBLE SHOTTING is, as its name implies, an augmentation of the destructive power of ordnance, by doubling the shot fired off at one time from a gun. Sometimes three shots are fired at once, in which case the piece is said to be "treble-shotted."

DOUBLE STARS. As seen by the naked eye all stars appear to be single, but the telescope shows us that many are double, while it resolves others into several distinct bodies. In some instances telescopes of low power suffice to reveal the separation; others require instruments of the largest kind and very delicate adjustment. The object-glass especially needs to be free from all defects. Sometimes one of the components of a double star may hide another from view, and in other instance, while they are apparently near, they may yet be far from each other in almost the same line of sight. In certain cases, Herschel found that one of the components described an orbit about the other. A star which is single to ordinary vision, but which may be resolved into two stars thus physically related, is called a binary star. The components of the same star are almost invariably of a different color. The colors of some double stars, however, are complementary, producing together white light. Eight of the stars known to be physically double have periods of revolution less than a century, while about 400 appear to have a period of more than 1000 years for this process.

DOUB'LET (so called from being originally lined or wadded for defense) was a close, tight-fitting garment, the skirts reaching a little below the girdle. It was almost identical with the jerkin. The sleeves were sometimes separate, and tied on at the arm.

DOUBLING THE CUBE was a celebrated geometrical problem among the ancients. The object was to find the side of a cube whose content should be twice that of another given cube; and various accounts are given of how the problem was suggested. One legend brings the matter into connection with Delos (hence the name of "the Delian problem"), and relates that the oracle of Apollo in that island, being consulted by the inhabitants during the prevalence of a pestilence, gave for answer, that they should make the altar of Apollo, which was in the form of a cube, as large again. This was done, and yet the pestilence continued; and the oracle being again consulted, replied, that the altar must retain its cubic form, which had not been attended to in the enlargement. This problem perplexed the Delians, as it did mathematicians of after-ages. Even Plato, whom they consulted on the difficulty, could give them no solution, and had recourse, according to the story, to evasion.

The problem, however, is older than Plato; before his time, it had occupied Hippocrates of Chios (not the physician Hippocrates), and was studied afterwards by Eratosthenes, Nicomedes, Hero, and others. Apollonius applied conic sections to the solution of the question, as did also Menæchmus; Nicomedes invented a curve, which he called the conchoid, for the express purpose, and Diocles the cissoid. The analytical method introduced into geometry by Descartes showed this problem in its true light. It was seen to be only a special case of the solution of a cubic equation—a solution which is impossible by geometry, i.e., by the use of the circle and straight line. It may, however, be represented by the intersection of two conic sections, of which one may be a circle. Descartes made use of the parabola with the circle, which is the simplest way. With numbers, the question is merely one of the extraction of the cube

root. If the side of a cube be one foot, its solid content is $1 \times 1 \times 1 = 1$ cubic foot. The side of a cube of double that content, or 2 cubic feet, is $\sqrt[3]{2} = 1.259921$.

DOUBLINGS, the heraldic term for the linings of robes or mantles, or of the mantlings of achievements. See MANTLING.

DOUBLOON (Sp. *dublone*, double) is the name of a gold piece coined in Spain and Spanish America. The dublon de Isabella, coined since 1848, is of 100 reals, and equivalent to 25 84 French francs, or 20*s.* 8*d.* The older Spanish doubloons vary in value from 85 to 81 francs.

DOUBS, a department of France, on the eastern frontier, separated from Switzerland by the Jura mountains, is situated in lat. 46° 35′ to 47° 31′ n., and long. 5° 42′ to 7° 4′ east. Area about 2,000 sq. miles. Pop. '76, 306,094. D. is traversed by the river Doubs, a tributary of the Saone, and is separated, on the n.w., from the department of Haute Saone by the Oignon, also a tributary of the Saone. The surface is hilly, being crossed by four parallel ranges of the Jura mountains. The climate is more rigorous than in most similar latitudes. The pine and the walnut attain a huge size, and the common orchard trees thrive well. Maize, potatoes, hemp, and flax are raised. The pasturage is excellent, and rears good breeds of horned cattle and horses, which are exported. In the valleys, great quantities of butter and cheese are produced. The rivers are well stored with fish. Mines of iron and coal are worked, and gypsum and marble are abundant. The trade is principally in iron, cattle, horses, and dairy produce. D. is divided into the four arrondissements of Besançon, Baume-les-Dames, Montbelliard, and Pontarlier. The capital of D. is Besançon.

DOUCHE. See BATH and HYDROPATHY.

DOUGH is the name given to the moistened and kneaded flour in the first stage of making bread (q.v.).

DOUGHERTY, a co. in s.w. Georgia, on Flint river; crossed by two railroads; 300 sq.m.; pop. '70, 11,517—9,424 colored. It is level and fertile, producing corn, oats, cotton, etc. Co. seat, Albany.

DOUGLAS, a co. in n.e. Colorado, on the Kansas border; traversed by the Kansas Pacific and the Denver and Rio Grande railroads; 4,500 sq.m.; pop. '70, 1388. The bottom-lands are fertile; other parts are more adapted to grazing. Coal and iron are found. Productions chiefly agricultural. Co. seat, Castle Rock.

DOUGLAS, a co in s.e. Dakota, formed after the census of 1870; about 500 sq. miles. It is not yet settled.

DOUGLAS, a co. in n.w. Georgia, formed after the census of 1870. It is on the Chattahoochee river, and has an area of about 300 sq. miles. Cotton and corn are the chief productions, and minerals are found. Co. seat, Douglasville.

DOUGLAS, a co, in e. Illinois, on Kaskaskia and Embarras rivers; intersected by the Chicago division of the Illinois Central railroad; 375 sq.m.; pop. '70, 13,484. It has a level surface and fertile soil, producing corn, oats, wheat, wool, and butter. Co. seat, Tuscola.

DOUGLAS, a co. in e. Kansas, on the Kansas river, intersected by the Leavenworth, Lawrence, and Galveston railroad; 470 sq.m.; pop. '78, 18,971. It is of rolling upland, with a black loamy soil, producing corn, wheat, butter, etc. Co. seat, Lawrence.

DOUGLAS, a co. in. w. Minnesota, reached by the (proposed) St. Paul and Pacific railroad; 720 sq.m.; pop. '75, 6,319. The surface is mostly level, and there are many small lakes. Productions agricultural. Co. seat, Alexander.

DOUGLAS, a co. in s. Missouri, on the upper waters of the White river; 648 sq.m.; pop. 70, 3,915. The surface is hilly, much of it still covered with forests. Lead ore is found. The productions are chiefly agricultural. Co. seat, Ava.

DOUGLAS, a co. in e. Nebraska, on the Missouri river, bounded on the w. by the Platte, traversed by the Union Pacific and the Omaha and Southwestern railroads; 350 sq.m.; pop. '76, 25,722. The soil is fertile, and the surface an undulating prairie. Productions agricultural. Co. seat, Omaha.

DOUGLAS, a co. in w. Nevada, on the California border; 900 sq.m.; pop. '75, 1718. It is a rough region, but embraces the most fertile portion of the Carson valley. There are pine forests in the mountains, and water-power is abundant. Gold, silver, and copper are found, but mining is not prosecuted to any great extent. Productions agricultural. Co. seat, Genoa.

DOUGLAS, a co. in s. Oregon, on the Umpqua river; crossed by the Oregon and California railroads; 5,000 sq.m.; pop '75, 6,033. Productions, wheat, corn, barley, butter, wool, etc. Co. seat, Roseburg.

DOUGLAS, a co., in n.w. Wisconsin, on lake Superior and the Minnesota border; reached by the Lake Superior and Mississippi railroad; 1300 sq.m.; pop. '75, 741. Agriculture is the principal business. Co. seat, Superior.

DOUGLAS, DAVID, 1798-1834; a botanist, native of Scotland. He was employed in the Glasgow botanic garden for a time; then sent abroad as collector of specimens;

for the botanical society of London. In 1824, he explored a great part of Oregon and California, and in 1827, crossed the continent from fort Vancouver to Hudson bay, returning with sir John Franklin to England. In 1829, he visited the Sandwich islands, where, falling into a pit for entrapping wild cattle, he was gored to death by an animal already caught.

DOUG'LAS, the largest t. and principal seaport of the Isle of man, is so called from its being situated near the junction of two streams—the *Dhoo* (black) and *Glass* (gray). D. lies on the margin of a highly picturesque bay, on the e. side of the island. From the excellence of the sea-bathing, and its central position, it is fast increasing in importance as a watering-place. The old town, standing on the south-western edge of the bay, consists of narrow tortuous streets, and presents a vivid contrast to the handsome modern terraces and villas which occupy the rising ground beyond. Lately the erection of a deep-water landing pier has removed the necessity of passengers landing in small boats. A new street from this pier leads through the heart of the old town, a bill, or act of Tynwald, having been passed directing its formation. Conspicuous in the center of the crescent of the bay stands castle Mona, formerly the residence of John, duke of Athol, but now converted into a first-class-hotel. The tower of refuge, a picturesque object, occupies a dangerous rock, in the southern area of the bay, called Conister, and was erected in 1833 for the safety of shipwrecked mariners, by the late sir William Hillary, bart., who, during his residence at D., founded the royal national life-boat institution. D. is the principal packet station of the island, and possesses telegraphic communication with England. Pop. '71, 13,846.

DOUG'LAS, THE FAMILY OF. Archæology has failed in its efforts to pierce the obscurity which veils the origin of the heroic race of which it has been said:

> So many, so good as of Douglas blood have been,
> Of one surname, in one kingrick, never yet were seen.

A legend of the 16th or 17th c. told how, about the year 770, a Scottish king, whose ranks had been broken by the fierce onset of a lord of the isles, saw the tide of battle suddenly turned by an unknown chief; how, when the victory was won, the monarch asked where was his deliverer; how the answer ran in Erse, *Sholto Du-glas* ("Behold that dark-gray man"); and how the warriar was rewarded with that Clydesdale valley which, taking from him its name of Douglas, gave surname to his descendants. This fable has long ceased to be believed. Equal discredit has fallen on the theory which, 60 years ago, the laborious Chalmers advanced in his *Caledonia*, that the Douglases sprang from a Fleming of the name of Theobald, who, between the years 1147 and 1164, had a grant of lands on the Douglas water from the abbot of Kelso. There is no trace of any connection between the Flemish Theobald and the Douglases; nor were the lands which he acquired on one side of the stream any part of their old domain on the other. What was boasted of the Douglases by their historian, two centuries ago, therefore still holds true: "We do not know them in the fountain, but in the stream; not in the root, but in the stem; for we know not who was the first mean man that did by his virtue raise himself above the vulgar." It was thought likely, in the beginning of the 15th c., that the Douglases and the Murrays had come of the same stock, and in this old conjecture all that is known on the subject must still be summed up.

1. *William of Douglas,* the first of the family who appears in record, was so-called, doubtless, from the wild pastoral dale which he possessed. He is found witnessing charters by the king and the bishop of Glasgow between 1175 and 1213. He was either the brother or the brother-in-law of sir Freskin of Murray, and had six sons, of whom Archibald, or Erkenbald, was his heir; and Brice, a monk of Kelso, rose to be prior of Lesmahago (a dependency of Kelso, on the outskirts of Douglasdale), and in 1203 was preferred to the great bishopric of Murray. He owed this promotion, no doubt, to the influence of his kinsmen the Murrays, and it contributed not a little to the rising fortunes of his own house. He was followed beyond the Spey by four brothers, of whom one became sheriff of Elgin; another became a canon of Murray; a third, who had been a monk of Kelso, seems to have become archdeacon of Murray; and a fourth, who had been parson of Douglas, appears to have become dean of Murray.

2. *Sir Archibald, or Erkenbald, of Douglas* is a witness to charters between 1190 and 1232. He attained the rank of knighthood, and beside his inheritance of Douglas, held the lands of Hailes, on the Water of Leith, from the monks of Dunfermline, and had a grant of the lands of Levingston and Hirdmanston from the earl of Fife. He is said to have acquired other lands in Clydesdale by his marriage with one of the two daughters and heiresses of sir John of Crawford.

3. *Sir William of Douglas,* apparently the son of sir Archibald, figures in record from 1240 to 1273. He appears in 1255 as one of the Scottish partisans of king Henry III. of England; and in 1267, is found in possession of the manor of Fawdon, in Northumberland, by gift of the king's son (afterwards Edward I.). He seems to have had a brother, sir Andrew, the progenitor of the Douglases of Dalkeith and Morton, and certainly had two sons.

4. *Hugh of Douglas,* the elder, acquired land in Glencorse, in Lothian, by marriage with the sister of sir Hugh of Abernethy; and dying without issue about 1287, was succeeded by his younger brother.

5. *Sir William of Douglas*, distinguished in the family traditions as *William the Hardy*, had all the daring and restless spirit which was characteristic of his descendants. His first appearance is in 1267, when his head was nearly severed from his shoulders in defending his father's English manor from a foray of the men of Redesdale. Twenty years later, he is found at the head of an armed band, carrying off his future wife, a wealthy widow, Alionora of Lovaine, from the manor of her kinsfolks, the La Zouches, at Tranent, in Lothian. We hear of him immediately afterwards as spoiling the monks of Melrose, deforcing the king's officers in the execution of a judgment in favor of his mother, unlawfully imprisoning three men in his castle of Douglas, and beheading one of them. He was the first man of mark who joined Wallace in the rising against the English in 1297; and for this his lands of Douglas were wasted with fire and sword, and his wife and children carried off by Robert Bruce, the young earl of Carrick, then a partisan of England. But the knight of Douglas soon left the insurgent banners, and submitting to his old patron, king Edward I., to whom he had again and again sworn fealty, was sent prisoner to the castle of York, where he died about 1302. It appears that he possessed lands in one English, and in seven Scottish counties—Northumberland, Berwick, Edinburgh, Fife, Lanark, Ayr, Dumfries, and Wigton.

6. The history of his son, *the Good Sir James of Douglas*, is familiar to every one, as Bruce's greatest captain in the long war of the succession. The hero of seventy fights, he is said to have won them all but thirteen, leaving the name of "the black Douglas" —so he was called from his swarthy complexion—as a word of fear by which English mothers stilled their children. He was slain in Andalusia, in 1330, on his way to the Holy Land with the heart of his royal master, and dying unmarried, was succeeded by his brother.

7. *Hugh of Douglas*, of whom nothing is known except that he made over the now great domains of his family, in 1342, to his nephew *Sir William of Douglas* (son of a younger brother of the good sir James—sir Archibald of Douglas, regent of Scotland, slain at Halidon hill in 1333).

Earls of Douglas.—Hitherto, the Douglases had no higher title than that of knight; but in 1357, sir William of Douglas, who had fought at Poitiers, and distinguished himself in other fields, was made earl of Douglas, and afterwards by marriage became earl of Mar. His ambition aimed at still greater things, and in 1371 he disputed the succession to the Scottish crown with Robert II. (the first of the Stewarts). He claimed as a descendant of the Baliols and Cummings; and his pretensions were abandoned only on condition that his son should marry the king's daughter. He died in 1384. His son James, second earl of Douglas and Mar, the conqueror of Hotspur, fell at Otterburn in 1388; and as he left no legitimate issue, the direct male line of William the hardy and the good sir James now came to an end. His aunt had married for her second husband one of her brother's esquires, James of Sandilands, and through her lord Torphichen is now the heir general and representative at common law of the house of Douglas.

The earldom of Douglas, meanwhile, was bestowed on an illegitimate son of the good sir James—Archibald, lord of Galloway, surnamed the grim. By his marriage with the heiress of Bothwell, he added that fair barony to the Douglas domains; and having married his only daughter to the heir-apparent of the Scottish crown, and his eldest son to the eldest daughter of the Scottish king, he died in 1401. His son and successor, Archibald, fourth earl of Douglas, was, from his many misfortunes in battle, surnamed "the Tyneman," i.e., the loser. At Homildon, in 1402, he was wounded in five places, lost an eye, and was taken prisoner by Hotspur. Next year, at Shrewsbury, he felled the English king to the earth, but was again wounded and taken prisoner. Repairing to France, he was there made duke of Touraine, and fell at Verneuil in 1424. He was succeeded by his son Archibald, who distinguished himself in the French wars, and dying in 1439, was buried in the church of Douglas, where his tomb yet remains, inscribed with his high titles of "duke of Touraine, earl of Douglas and of Longueville, lord of Galloway, Wigton, and Annandale, lieutenant of the king of Scots." His son and successor, William, a boy of sixteen, is said to have kept a thousand horsemen in his train, to have created knights, and to have affected the pomp of parliaments in his baronial courts. His power and foreign possessions made him an object of fear to the Scottish crown; and, having been decoyed into the castle of Edinburgh by the crafty and unscrupulous Crichton, he was, after a hasty trial, beheaded, along with his brother, within the walls of the castle, in 1440. His French duchy and county died with him; his Scottish earldom was bestowed on his grand-uncle (the second son of Archibald the grim), James, surnamed the gross, who in 1437 had been made earl of Avondale. He died in 1443, being succeeded by his son William, who, by marriage with his kinswoman (the only daughter of Archibald, fifth earl of Douglas, and second duke of Touraine), again added the lordship of Galloway to the Douglas possessions. He was, for a time, all-powerful with king James II., who made him lieut.gen. of the realm; but afterwards losing the royal favor, he seems to have entered into a confederacy against the king, by whom he was killed in Stirling castle, in 1452. Leaving no child, he was succeeded by his brother James, who, in 1454, made open war against king James II., as the murderer of his brother and kinsman (the sixth and eighth earls of Douglas). The issue seemed doubtful for a time,

but the Hamiltons and others being gained over to the king's side, Douglas fled to England. The struggle was still maintained by his brothers, Archibald, who by marriage had become earl of Murray, and Hugh, who in 1445 had been made earl of Ormond. They were defeated at Arkinholm in May, 1455, Murray being slain on the field, and Ormond taken prisoner, and afterwards beheaded. Abercorn, Douglas, Strathaven, Thrieve, and other castles of the Douglases, were dismantled; and the earldom of Douglas came to an end by forfeiture, after an existence of 98 years, during which it had been held by no fewer than nine lords. The last earl lived many years in England, where he had a pension from the crown, and was made a knight of the garter. In 1484, he leagued himself with the exiled duke of Albany to invade Scotland. He was defeated and taken prisoner at Lochmaben, and, on being brought to the royal presence, is said to have turned his back upon the king. The compassionate James III. spared his life, on condition of his taking the cowl. "He who may no better be, must be a monk," muttered the old man, as he bowed to his fate. He died in the abbey of Lindores, in April, 1488; and so ended the elder illegitimate line of the Douglases.

Earls of Angus.—Meanwhile a younger illegitimate branch had been rising to great power. William, first earl of Douglas, was the faithless husband of a faithless wife. She was believed to have had a paramour in sir William Douglass of Liddesdale. Her jealous husband, who slew that "flower of chivalry," had himself shared the affections of the wife of his wife's brother, Margaret Stewart, countess of Angus and Mar. The issue of this amour, which in that age was accounted incestuous, was a son George, who, in 1389, had a grant of his mother's earldom of Angus; married, in 1397, the youngest daughter of king Robert III.; was taken prisoner at Homildon in 1402, and died of the plague in England in the following year. He was succeeded by his son William, who, dying in 1437, was succeeded by his son James, who died without issue, when the title reverted to his uncle. George, fourth earl of Angus, took part with the king against the Douglases in 1454; his loyalty was rewarded by a grant of their old inheritance of Douglas-dale; and so, in the phrase of the time, "the Red Douglas"—such was the complexion of Angus—"put down the Black." He died in 1462, being succeeded by his son Archibald, surnamed Bell-the-Cat, and sometimes also called the great earl. After filling the highest offices in the state, and adding largely to the family possessions, he retired to the priory of canons regular at Whithorn, in Galloway, where he died in 1514. Having outlived his eldest son, he was succeeded by his grandson, Archibald, who, in 1514, married the queen-dowager of Scotland, Margaret, sister of Henry VIII. of England, and widow of James IV. of Scotland. The fruit of this marriage was a daughter, Margaret, who, marrying the earl of Lennox, became the mother of Henry, lord Darnley, the husband of queen Mary, and father of king James VI. The earl of Angus had, for a time, supreme power in Scotland, but in 1528, the young king, James V., escaped from his hands, and sentence of forfeiture was passed against Angus and his kinsmen. The king swore that while he lived the Douglases should have no place in his kingdom; and he kept his vow. On his death in 1542, Angus returned to Scotland, and was restored to his honors and possessions. He died at Tantallon in 1556. His nephew, who succeeded him, died two years afterwards, leaving an only son, Archibald, eighth earl of Angus. This "good earl," as he was called, died in 1588, when his title devolved on his kinsman William, the grandson of sir William Douglas of Glenbervie, second son of Archibald Bell-the-Cat. Dying in 1591, he was succeeded by his son William, who next year obtained from the crown a special recognition of his high privileges as earl of Angus, of taking the first place and giving the first vote in parliament, of leading the vanguard in battle, and of bearing the crown in parliament. He seems to have been a man of scholarly tastes, and is said to have written a history of the Douglases. Having turned Roman Catholic, he was forced to leave Scotland, and spent his latter years in exercises of devotion at Paris, where he died in 1611, being succeeded by his son.

Marquises and Duke of Douglas, and Lords Douglas.—William, eleventh earl of Angus, was created marquis of Douglas in 1633, and dying in 1660, was succeeded by his grandson James, who died in 1700, leaving issue one son and one daughter. The son Archibald, third marquis of Douglas, was created duke of Douglas in 1703, and died childless in 1761, when his dukedom became extinct, and his marquisate devolved on the duke of Hamilton, as descended in the male line from William, earl of Selkirk, third son of the first marquis of Douglas. His grace's sister, lady Jane Douglas, born in 1698, and married in 1746 to sir John Stewart of Grandtully, was said to have given birth at Paris to twin sons in 1748. One of them died in 1753; the other, in 1761, was served heir of entail and provision general to the duke of Douglas. An attempt was made to reduce his service, on the ground that he was not the child of lady Jane Douglas; but the house of lords, in 1771, gave final judgment in his favor. He was made a British peer in 1790, by the title of baron Douglas of Douglas castle, which became extinct on the death of his son James, fourth lord Douglas, in 1857, when the Douglas estates devolved on his niece, the countess of Home. The title of earl of Angus was claimed in 1762, as well by the duke of Hamilton as by Archibald Stewart, afterwards lord Douglas; but neither urged his claim to a decision, and the title is still in abeyance. The right attached to it of bearing the crown of Scotland, was debated before the privy council in 1823, when it was ruled that lord

Douglas's claim to that honor, being a claim of heritable right, fell to be decided in a court of law. It has been supposed that the motto of the Douglas arms, *Jamais arrière*, "Never behind," alludes to the peculiar precedence inherent in their earldom of Angus. The bloody heart commemorates Bruce's dying bequest to the good sir James; the three stars which the Douglases bear in common with the Murrays, seems to denote the descent of both from one ancestor.

EARLS OF MORTON.—Sir Andrew of Douglas, who appears in record in 1248, was apparently a younger son of sir Archibald, or Erkenbald, of Douglas, the second chief of the house. He was the father of William of Douglas, who, in 1296, swore fealty to king Edward I. for his lands in West Lothian, and who was probably the father of sir James of Douglas—surnamed of Lothian, to distinguish him from his kinsman of Clydesdale—who, in 1315, had a grant from Bruce of the lands of Kincavil and Calder-clere. He died about 1320, being succeeded by his son, sir William of Douglas of Liddesdale, who acquired the lordship of Dalkeith (by resignation of the Grahames), the barony of Aberdour in Fife, lands in Tweeddale, and great territories in Liddesdale, Eskdale, and Ewesdale which had been forfeited by the Soulises and Lovels. In 1335, he had a grant of the earldom of Athol, but resigned it in 1342. The knight of Liddesdale—as he was called by his contemporaries, who regarded him as "the flower of chivalry"—was assassinated in 1353 by his kinsman, William first earl of Douglas, partly to revenge his wife's dishonor, partly to revenge the death of sir David of Barclay, who had been assassinated at the instance of the knight of Liddesdale, in revenge for the slaughter of his brother John. Dying childless, he was succeeded by his nephew, sir James of Douglas of Dalkeith. This great chief, who died in 1420, saw Froissart sit as a guest at his board; himself possessed books of law, grammar, logic, and romance; and enjoined in his will that all the volumes which he had borrowed from his friends should be returned to them. His alliances were as princely as his life. His first wife was a daughter of "Black Agnes," the heroic countess of Dunbar; his second was a sister of king Robert II.; and he matched his eldest son, sir James of Douglas of Dalkeith, with a daughter of king Robert III. Their grandson married a daughter of king James I., and in 1458, was created earl of Morton. His grandson, the third earl, dying without male issue in 1553, the earldom devolved on his daughter's husband, the regent Morton—James Douglas, great-grandson of Archibald Bell-the-Cat. After his fall, the title went to Archibald eighth earl of Angus; and when he died childless in 1588, it passed to the lineal male descendant of sir Henry of Douglas (the son of sir John of Douglas, the brother of the knight of Liddesdale), sir William Douglas of Lochleven, who thus became seventh earl of Morton. His losses in the great civil war compelled him, in 1642, to sell Dalkeith to the earl of Buccleuch, and his Tweeddale and Eskdale lands to others; but Aberdour and other old domains of the family still remain with his successor, the earl of Morton, who, there is every reason to believe, descends legitimately in the male line from William of Douglas, the great progenitor of the race in the 12th century.

EARLS, MARQUISES, AND DUKES OF QUEENSBERRY; EARLS OF MARCH, AND EARLS OF SOLWAY.—James, second earl of Douglas and Mar—the hero of Otterburn—had an illegitimate son, sir William of Douglas of Drumlanrig, whose descendants were created viscounts of Drumlanrig in 1628, earls of Queensberry in 1633, marquises of Queensberry in 1682, dukes of Queensberry in 1684, earls of March in 1697, and earls of Solway in 1706. On the death of the fourth duke of Queensberry in 1810, that title, with the barony of Drumlanrig and other lands, went to the duke of Buccleuch; the title of marquis of Queensberry, with the baronies of Tinwald, Torthorwald, etc., went to the heir-male of the family, sir Charles Douglas of Kelhead; and the title of earl of March, with the barony of Neidpath, went to the earl of Wemyss. The title of earl of Solway had become extinct in 1778.

EARLS OF SELKIRK, FORFAR, AND DUMBARTON; VISCOUNT BELHAVEN, AND LORDS MORDINGTON.—In 1646, the third son of the first marquis of Douglas was created earl of Selkirk. In 1651, the eldest son of the same marquis was created earl of Ormond, and in 1661, earl of Forfar. In 1675, the fourth son of the same marquis was created earl of Dumbarton. In 1641, the second son of the tenth earl of Angus was created lord Mordington. In 1633, sir Robert Douglas of Spot, a descendant of the Morton family, was created viscount of Belhaven. Of all these titles, that of the earl of Selkirk is the only one not now dormant or extinct.

A *History of the Houses of Douglas and Angus*, by David Hume of Godscroft, was published at Edinburgh in 1644, in 1 vol. fol., and reprinted in 1748 in 2 vols. 8vo. It preserves the traditions of the family, and has some literary merit, but its accuracy is not to be trusted. The earlier history of the Douglases has been critically examined by the late George Chalmers in his *Caledonia*, vol. i. pp. 579–84 (Lond. 1807); by Mr. Riddell in his *Remarks upon Scotch Peerage Law*, pp. 174–78 (Edin. 1833); by Mr. Cosmo Innes, in the *Registrum Episcopatus Moraviensis*, pp. xliv.-xlvii. (Edin. 1837); and the *Liber S. Marie de Calchou*, vol. i. pp. xxvii., xxviii. (Edin. 1846); and by Mr. Joseph Robertson in the *Origines Parochiales Scotiæ*, vol. i. pp. 152–60 (Edin. 1851). The descent of the houses of Angus and Dalkeith was first ascertained by Mr. Riddell in his *Remarks upon Scotch Peerage Law*, pp. 154–64 (Edin., 1833); and in his *Stewartiana*, pp. 82–4, 137–42. The charters and correspondence of the Morton family have

been edited for the Bannatyne club by Mr. Cosmo Innes in the *Registrum Honoris de Morton* (Edin., 1853, 2 vols. 4to).

DOUGLAS, GAWYN or GAVIN, a Scottish poet, was the third son of Archibald, fifth earl of Angus, and was b. in the year 1474 or 1475. He was educated at St. Andrews for the church, and was early appointed to the rectory of Hawch or Prestonkirk. In 1501 he was made dean or provost of the collegiate church of St. Giles. From the marriage of his nephew, the sixth earl of Angus, to the widowed queen of James IV., Douglas expected rapid preferment; but the jealousy of the nobility and the regent Albany was such that D., who had through the influence of the queen obtained the bishopric of Dunkeld directly from the pope, was tried before the Scottish peers, found guilty of conspiring against the privileges of the crown, and condemned to imprisonment. After reconciliation with the regent, he was set at liberty in about a year, and inducted into his bishopric. Owing to his nephew's ill-treatment of the queen, who thereupon joined with the regent against the Douglases, Gavin D. was deprived of his bishopric, on which he went to England to obtain the aid of Henry VIII. He was, however, suddenly cut off at London by the plague in 1522, and was buried in the Savoy church. One of D.'s earliest poetic efforts was a translation of Ovid's *Remedy of Love*, but it has not been preserved. In 1501, he wrote his *Palace of Honor*, addressed to king James IV. The leading idea of the poem, and some of the details, resemble Chaucer's *Temple of Fame*. *King Hart*, the only other long poem of D., presents a metaphorical view of human life. But the most remarkable production of this author was a translation of Virgil's *Æneid* into Scottish verse, which he executed in the years 1512 and 1513, being the first version of a Latin classic published in Britain. It is generally allowed to be a masterly performance, though in too obsolete a language ever to be popular. D.'s verse is far from rhythmical to modern ears; yet the felicitous character of his allegories, and the rich beauty of his descriptions, might well tempt the lovers of genuine poetry to give him a trial. A collected edition of his works in four volumes was issued under the superintendence of John Small, M.A., in 1874.

DOUGLAS, GENERAL SIR HOWARD, Bart., G.C.B., son of admiral sir C. Douglas, was b. at Gosport in 1776. Entering the army when young, he served in Spain and Portugal in 1808 and 1809, and again in Spain in 1811 and 1812. He was governor of New Brunswick from 1823 to 1829, lord high commissioner of the Ionian Islands from 1835 to 1840, and from 1842 to 1847 was M.P. for Liverpool. In 1851, he became a gen. in the army, and col. of the 15th regiment of foot. He has written several treatises, among which are *An Essay on the Principles and Construction of Military Bridges, and the Passage of Rivers in Military Operations* (Lond. 1816); a treatise on *Naval Gunnery* (1819; 4th edit., 1855); *Observation on Carnot's Fortification*, etc. His treatise on *Naval Gunnery* is regarded as a standard authority in foreign countries, although his recommendations were not acted upon by the British admiralty until 13 years after the publication of his work. He censured the conduct of the war in the Crimea in 1855, and declared that Sebastopol could not be reduced unless by a change in the plan of operations, such as he traced. His prophecy was verified by the event. He also published *Considerations on the Value and Importance of the British and North American Provinces*, and a treatise entitled *Naval Evolutions*. He died Nov., 1861.

DOUGLAS, JOHN, D.D., was the son of a respectable shopkeeper of Pittenweem, Fifeshire, and was b. there in 1721. In 1736, he entered St. Mary's college, Oxford, where he took his bachelor's degree after five years' study. D.'s life is little more than a chronicle of his very numerous preferments, which ended in his being translated to the see of Salisbury in 1791. He died on the 18th May, 1807. D. only occasionally resided on his livings. He generally spent the winter months in London, and the summer months at the fashionable watering-places, in the society of the earl of Bath, who was his great patron. He was devoted to literature; but most of his productions were only interesting to his own time. Among other works chiefly of a pamphlet kind, he wrote a *Vindication of Milton from the Charge of Plagiarism, adduced by Lauder* (1750); *A Letter on the Criterion of Miracles* (1754); an ironical pamphlet against the Hutchinsonians and Methodists, entitled *The Destruction of the French Foretold by Ezekiel* (1759); and the *Introduction and Notes to Captain Cook's Third Voyage* (1781).

DOUGLAS, STEPHEN ARNOLD, 1813–61; a statesman; b. Brandon, Vt., d. Chicago. His father, a respectable physician, died when he was two months old, leaving the mother in straitened circumstances. The son lived with her on a farm until he was 15 years old, when he apprenticed himself to a cabinet-maker. Before the end of two years his health failed and he abandoned his occupation. After attending Brandon academy for one year, he removed with his mother to Canandaigua, N. Y., and resumed his studies in the academy there, at the same time beginning to prepare himself for the legal profession. In 1833, he went to Winchester, Ill., walking a part of the way for lack of funds, and opened a school, which he taught for three months, still pursuing his studies for the bar. In 1834, he was admitted to practice and within a year was elected attorney-general for the state. He resigned this office, Dec., 1835, on being elected a member of the legislature. In 1837, he was appointed register of the United States land office at Springfield, but resigned in 1839. In 1837, he was nominated for member of congress by the democratic party, and came very near an election. In 1840,

he was appointed secretary of state of Illinois. In 1841, he was elected a judge of the supreme court of the state by the legislature, but resigned in 1843 to become again a candidate for congress. He was elected this time by over 400 majority, and re-elected for two successive terms. He resigned after his election for the third time, to accept the post of senator of the United States for six years from Mar. 4, 1847. As a member of the house of representatives, he took an active part in the political discussions of the time. In the Oregon controversy he took extreme ground against Great Britain, claiming the whole territory for the United States up to lat. 54° 40′. He was also an earnest advocate for the annexation of Texas, and as chairman of the committee on territories, 1846, reported the joint resolution declaring that country to be one of the states of the American union. He was an ardent supporter of president Polk in the war with Mexico. The bills to organize the territories of Minnesota, Oregon, New Mexico, Utah, Washington, Kansas, and Nebraska, were all reported by him, as were also those providing for the admission to the union of the states of Iowa, Wisconsin, California, Minnesota, and Oregon. He was a strenuous opponent of the "Wilmot proviso," and of every other measure for resisting the extension of slavery by federal action, holding to the doctrine called "squatter sovereignty"—the doctrine, in other words, that the settlers in a territory had the right to say whether they would have slavery or not. In Aug., 1848, however, he so far relinquished this doctrine as to propose an amendment to the Oregon bill, extending the Missouri compromise line of 36° 30′ to the Pacific, thus prohibiting slavery in the region n. of that line, and recognizing it in that s. thereof. The amendment prevailed in the senate, but was lost in the house of representatives. The land was now filled with excitement upon the slavery question, and the compromise measures of 1850 were devised and passed as a "final settlement" of the controversy. Instead of quieting the agitation, however, they fanned it to an intenser heat. In 1852, D. was an unsuccessful candidate for the democratic nomination for president of the United States. During the congressional session of 1853–54, he reported the bill to organize the territories of Kansas and Nebraska, the freedom of which from slavery was solemnly guaranteed by the Missouri compromise of 1820. This restriction Douglas now proposed to repeal or disregard, leaving those territories under the doctrine of "squatter sovereignty," open to the introduction of slavery. The enactment of this measure created intense excitement in the northern states, and D. was hotly denounced. From this time forward the question of the extension or non-extension of slavery was the paramount issue before the country—the compromise measures of 1850 proving utterly abortive as a means of stopping anti-slavery agitation. In 1856, D. was again a candidate for the presidential nomination of his party, but James Buchanan gained the nomination. In 1858, desiring a re-election to the senate, he engaged in a political canvass of the state of Illinois—Abraham Lincoln, the republican candidate for senator, being his antagonist. They spoke from the same platform in regular debate, upon conditions mutually agreed to, in every quarter of the state. A majority of the popular vote was cast against him, but D. carried the legislature by a small majority, and was consequently re-elected to the senate. He was in favor of the annexation of Cuba to the United States, and a warm champion of the Pacific railroad. In the presidential election of 1860, the democratic party was divided, D. being supported by the northern and Breckinridge by the southern section. The republicans nominated and elected Abraham Lincoln. After the beginning of the war of the rebellion, D. took strong ground in favor of the union, giving his influence to uphold the general government. During his last illness, he dictated for publication a letter in which he declared it to be the duty of all patriotic men to sustain the union, the constitution, the government, and the flag, against all assailants. He was short of stature, but stoutly built, and was familiarly called "the little giant." He was endowed with qualities which gave him great power over masses of men. His first wife (1847) was Martha, daughter of col. Robert Martin of Rockingham co., N. C.; his second, Adele, daughter of James Madison Cutts of Washington. By his first wife he had three children, the eldest of whom, Robert Martin Douglas, was for a time private secretary of president Grant.

DOUGLASS, David Bates, 1790–1849; b. N. J.; graduate of Yale, 1813. He went into the army, and was one of the defenders of fort Erie, for which he was brevetted captain. In 1815, he was assistant professor of natural and experimental philosophy at West Point; in 1819, astronomical surveyor in fixing the boundary with Canada from Niagara to Detroit, and the next year in the same capacity further west. In 1832, he accepted the professorship of civil architecture in the university of New York, and prepared the designs for the building on Washington square. He surveyed the region of Croton river, with a view to a supply of water for the city; his plan was accepted, and he was appointed chief engineer. In 1839, he planned and laid out Greenwood cemetery. From 1841 to 1844, he was president of Kenyon college. In after years he laid out cemeteries at Albany and Quebec. His last official position was professor of mathematics and natural philosophy in Hobart college.

DOUGLASS, Frederick, American orator and journalist, was born at Tuckahoe, near Easton, Maryland, about 1817. His father was a white man, his mother a negro slave, and he was reared as a slave on the plantation of col. Edward Lloyd until 10 years old, when he was transferred to a relative of his owner at Baltimore. There he

worked in a ship-yard, and taught himself to read and write. At the age of 21, he escaped to New York, and thence to New Bedford, in Massachusetts, where he married a woman of color, and worked until 1841, when he attended an anti-slavery convention at Nantucket, and spoke so eloquently on the subject of slavery, that he was employed as an agent of the Massachusetts anti-slavery society, and lectured for four years with great success. In 1845, he published his autobiography, and accepted an invitation to make a lecturing tour in Great Britain, where, in 1846, a contribution of £150 was made to buy his freedom. Returning to America, he established, in 1847, *Frederick Douglass's Paper*, a weekly abolition newspaper, at Rochester, N. Y. In 1855, he re-wrote his autobiography, under the title of *My Bondage and my Freedom*. In 1871, he was secretary to the Santo Domingo commission; and in 1872 was elected a presidential elector for the state of New York. Mr. D. is a tall, dark mulatto; a bold, vigorous, earnest, and fluent speaker, and a ready and able debator.

DOUR, a t. of Belgium, in the province of Hainault, 9 m. w.s.w. of Mons. It is well built and prosperous, and has several schools and a literary society. Coal and iron mines are worked in the vicinity; there are also many quarries, and to some extent, weaving, bleaching, and leather-dressing are carried on. Pop. 8,500.

DOU RO (Span. *Duēro*, Port. *Doūro*), the name of one of the largest rivers of Spain and Portugal, rises in the province of Old Castile, about 30 m. w.n.w. of the town of Soria. From its source its flows s.e. to Soria, then winds towards the w., and pursues a general westward direction till it reaches the Portuguese border; it then flows s.w., forming for about 60 m. the boundary between Spain and Portugal; then crossing Portugal and flowing w., it falls into the Atlantic below Oporto. Its Portuguese tributaries are comparatively small. The total length of the river is about 500 miles. The D. is a noble river, and flows through some of the most imposing rock-scenery in the world, as at Barca d'Alva; but is rapid, and of difficult navigation, on account of rocks, sand-banks, etc. It passes through a large portion of the wine-country of Portugal, and conveys the produce to Oporto for exportation in flat-bottomed boats, containing from 30 to 70 pipes each.

DOUROUCOU'LI, a small monkey of Brazil, sleeping by day but active and fierce at night in pursuit of birds and insects. The body is only about 9 in. long, the tail 14; fur soft and grayish white, with a brown stripe down the back. The dourouculi looks more like a cat than a monkey, and sits up like a dog. It has a harsh disagreeable voice, and is difficult to domesticate.

DOUSA, JANUS, (JAN VAN DER DOES), 1545–1604; a Dutch statesman, historian, poet, and philologist, the defender of Leyden. He studied at Douay, Paris, and in other cities, and became friendly with many eminent scholars. In 1572, he was sent as ambassador to England, and in 1574, was charged with the government and defense of Leyden, then besieged by the Spaniards. When the university of Leyden was founded he was appointed first curator. In 1585, he was sent to England to solicit assistance from queen Elizabeth. In 1591, he was a member of the states-general. His principal work was the *Annals of Holland*.

DOVE (probably from the same root as *dive*, owing to its habit of ducking the head; compare Lat. *columba* with Gr. *kolumban*, to dive), a name sometimes extended, as the name pigeon also is, to the whole family of *columbidæ*, sometimes like it restricted—at least when used without prefix—to the genus *columba* of the more recent ornithological systems. No distinction between the terms dove and pigeon is sanctioned either by constant scientific or general popular use. Audubon attempts to make a distinction, giving the name pigeon to those species of which many nests are built close together on the same trees, and dove to those which are solitary in their nidification; but this distinction is quite unsuitable to the European species, and contrary to British usage. See PIGEON.

DOVE. In Christian art, the dove is employed as an emblem of the Holy Ghost, no doubt from the fact of this being the form in which the Spirit descended on our Lord at his baptism. From the dove being also used to symbolize purity, it is generally represented white, with its beak and claws red, as they occur in nature. In the older pictures, a golden nimbus surrounds its head; the nimbus being frequently divided by a cross, either red or black. In stained glass windows we see the dove with seven rays proceeding from it, terminating in seven stars, significative of the seven gifts of the Holy Spirit. Holding an olive branch, the dove is an emblem of peace. When seen issuing from the lips of dying saints and martyrs, it represents the human soul purified by suffering. A dove with six wings is a type of the church of Christ; and when so employed, it has the breast and belly of silver, and the back of gold, two wings being attached to the head, two to the shoulders, and two to the feet. The pyx or box for containing the host (q.v.) in Catholic churches, is sometimes made in the form of a dove, and suspended over the altar; and the dove is often placed on the covers of fonts. In this position it may still be seen in parish churches in England.

DOVE, HEINRICH W., one of the ablest recent physicists of the continent, was b. in 1803, at Liegnitz, in Silesia, where his father was a merchant. He studied at Breslau and at Berlin, at the latter of which he took the degree of doctor in 1826. He was suc-

cessively "privatdocent" and assistant professor of natural philosophy in Königsberg. Having been transferred to a similar post in Berlin, he subsequently became full professor, and was elected to a seat in the royal academy of sciences. His writings, which are very numerous, are to be found in the memoirs of that academy, and in Poggendorff's Annalen, besides several published separately. The most celebrated of these refer to meteorology, climatology, induced electricity, and circularly polarized light. We may mention among his works *Ueber Mass und Messen* (2d edition, Berlin, 1835), a treatise on the art of measuring, and the origin and comparison of the metrical standards of different nations; *Meteorologische Untersuchugen* (Berlin, 1837), a remarkable treatise *Ueber die nicht periodischen Aenderungen der Temperaturvertheilung auf der Oberfläche der Erde* (4 vols., Berlin, 1840–47); *Untersuchungen in Gebiete der Inductionselectricität* (Berlin, 1843). In conjunction with other distinguished German philosophers, D. commenced, in 1837, the publication of an extensive series of treatises on different branches of natural philosophy. This work, called *Repertorium der Physik*, remains unfinished. In his capacity of director of all the Prussian observatories, he published annually an account of their labors. To him is due, amongst a great variety of optical discoveries, the application of the stereoscope to the detection of forged bank-notes—an ingenious and useful idea. To English readers, D. is best known by his treatise on the *Distribution of Heat on the Surface of the Globe*, which was published in 1853, by the British association. In this work he enters fully into the causes of periodic variations of temperature at different parts of the globe, and lays down in admirable charts the monthly and annual isothermal and isabnormal lines—thus tracing the variations in form and position of the different isothermals throughout the year. *Das Gesetz der Stürme* (4th ed., 1874) has also been translated (The Law of Storms). Other works are *Ueber Electricität* (1848); *Optische Studien* (1859); *Eiszeit, Föhn, u. Sirocco* (1867); *Klimatologie von Norddeutschland* (1871). D. died 6th April, 1879.

DOVE, Richard Wilhelm, b. Berlin, in 1833; 1862, professor in the university of Tübingen; in 1865, at Kiel, and in 1868, at Göttingen. He was a member of the Reichsrath in 1871, and sided with the liberals. In 1860, he established and began to edit the well-known periodical, *Zeitschrift für Kirchenrecht*, a leading European publication on ecclesiastical law. He still writes for this magazine.

DOVECOT. It is enacted by the Scottish statute, 1617, c. 19, that no person shall build a dovecot or pigeon-house, either in town or county, unless he be possessed of lands or teinds of the yearly value of ten chalders of victual, lying within at least 2 m. of it. It is also declared, that no person having such qualification shall build more than one dovecot within the "bounds foresaid." It has been held that the statute imposes no restraint on proprietors possessed of a greater rent, beyond limiting them to one dovecot for each portion of ground that yields ten chalders yearly. The statute does not extend to dovecots already built, and if a dovecot be challenged, it must be proved to have been built subsequently to the date of the statute, otherwise the contrary will be presumed. If an estate be purchased, or otherwise acquired from a person who was legally entitled to build a dovecot, the dovecot may be legally retained, but cannot be rebuilt if it become ruinous. The statute 2 Geo. III. c. 29, for the protection of pigeons, does not extend to Scotland. See Pigeon. Dovecot breakers are guilty of theft, and very severe punishments were assigned to them by the old statutes.

DOVER, the capital of Delaware; in Kent co., on Jones river and the Delaware railroad; 77 m. s. of Philadelphia; pop. '70, 6,394—1839 colored. It is regularly built, with straight, wide, well-shaded streets, crossing at right angles. There are some fine public edifices, notably the city hall, post-office, and court-house; and there is considerable manufacturing industry.

DOVER, a city of New Hampshire, U. S., founded in 1623, is the oldest in the state. It has considerable cotton, woolen, iron, brass, and leather manufactures, and extensive print-works, and is well supplied with churches and educational establishments. Its pop. in 1870 was 9,294.

DOVER (*ante*), the seat of justice of Strafford co., N. H., on the Cocheco, 2 m. above its junction with the Piscataqua, 12 m. from Portsmouth, on the Boston and Maine railroad; pop. '80, 11,693. It is handsomely laid out, and has a great number of fine residences, and some imposing public buildings. Water-power is supplied by the Cocheco, which here has a fall of 32 ft., the dry season being provided for by a great reservoir. The chief business is the manufacturing of cotton, wool, leather, carriages, hats and caps, machinery, etc., in which probably 2,000 persons are engaged. There are excellent schools and a good city library. The place was settled in 1623, and is the oldest town in the state. Like most of the early settlements in New England, Dover suffered from Indian attacks. In 1698, 23 of the people were killed and 29 carried into captivity. The city charter dates from 1855.

DOVER, a t. in Morris co., N. J., on the Rockaway river, the Morris canal, and a branch of the Delaware, Lackawanna, and Western railroad; pop. about 2,000. It is the center of an iron-mining region, and the people are largely engaged in the mining

and manufacturing of that material. There are also other manufactures. The surrounding scenery is beautiful.

DO'VER, a parliamentary and municipal borough in the e. of Kent, 66 m. e.s.e. of London, and the head-quarters of the south-eastern district of the British army, is not only a charmingly situated watering-place, but, being the nearest point of the English coast to France, is a seaport of rapidly growing importance. Within the last few years £750,000 have been expended by the government in constructing a magnificent pier, which, running out a distance of 2,100 ft. seawards, terminates in a fort fitted to bear two guns of heavy caliber, so mounted, that they will completely sweep the channel. This granite isthmus affords a safe anchorage for vessels in the stormiest weather, and travelers for Calais, about 25 m. distant, or Ostend, for which places passenger and cargo steamers leave twice a day, are enabled to embark or land in any state of the tide, or even when a furious gale is raging. Works which will cost over a million sterling are contemplated by the government to carry out a scheme for the erection of Dover bay into a naval rendezvous and coaling-station. The fortifications comprise Dover castle, which occupies a commanding position on the chalk cliffs, 375 ft. above the level of the sea, and in the construction of which Saxons and Normans displayed no small amount of ingenuity; the western heights, fort Burgoyne, the south front, the drop redoubt, the citadel, the western outworks, and the north center bastion. No special trade is attached to the town, which transacts a miscellaneous maritime business with the French and Belgian ports, and offers excellent harbor accommodation for every variety of shipping. Pop. of borough, which returns two members to parliament (1871), 28,506. D. is well sheltered by the cliffs, and ends landward in a charming valley leading to what is known as "The Garden of Kent." In Roman days it was known as Dubris; the Normans called it Dovere; the French, Douvres; whilst in legal documents of this day the town is Dovar, all four terms being variations of the word "Dour," the name of the small river which runs through the town. Fortified and walled by William the Conqueror, during whose reign it was nearly burned down, noted as the place of king John's submission to the pope, besieged by the French, held during the civil war by the parliamentarians, threatened by the first Napoleon, and celebrated as the head-quarters of the lord wardens of the cinque ports, D. holds a distinguished place in English history. Three submarine cables connect it with the continent, and, if the designs of eminent French and English civil engineers are practicable, a tunnel will soon be constructed under the channel, which will bring France within half an hour's journey from Dover.

DOVER, STRAIT OF (*Fretum Gallicum, Pas de Calais*), the sea-channel between England and France, connecting the English channel and North sea, whose tides meet here. It is 18 to 25 m. broad, and 6 to 29 fathoms deep, but at Warne and Ridge Shoals only 1½ to 4 fathoms. The English coast consists of chalk cliffs 300 to 600 ft. high, succeeded on the s. by lower greensand, and the French, from Calais to cape Grisnez, is of similar strata. Britain and the continent seem to have been once united here by an isthmus. In Aug., 1875, capt. Webb, an English naval officer, accomplished the wonderful feat of swimming the S. of D. in 21¾ hours.

DO'VERON, or DE'VERON, a river of the n.e. of Scotland, rising in the w. of Aberdeenshire, a little s. of the Buck of the Cabrach (2,377 ft. high). It runs 55 m. n.e., or 36 in a straight line, through adjacent parts of the counties of Aberdeen and Banff, and partly dividing them, past Huntly to the North sea at Banff. It drains a basin of 410 sq.m., composed of syenitic greenstone, metamorphic rocks, graywacke and old red sandstone.

DOVER'S POWDER is a preparation of powder of ipecacuanha 1 dram, opium in powder 1 dram, and sulphate of potash 1 ounce. The whole is thoroughly mixed, and the ordinary dose is from 5 to 10 grains. Occasionally, saltpeter is added. It is a most valuable medicine, and acts as a sudorific, increasing the proportion of sweat or sensible perspiration. In feverish conditions, where there is the dry furred tongue, and the dry skin, and the brain out of order, D. P. is reckoned to prove injurious; but where the tongue is moist, the skin moist and soft, and the brain comparatively unaffected. D. P. is of great service.

DO'VRE FJELD. See SCANDINAVIA.

DOW, LORENZO, 1777–1834; b. Conn.; an American preacher of limited education, noted for his eccentricities as well as zeal. In youth he was in much perplexity about religion, but finally joined the Methodists, and for a short time was a preacher in that denomination, which he left under a conviction that he was called to be a missionary to the Roman Catholics of Ireland. His preaching in that country attracted crowds of people, and brought him some persecution. He also visited England, introducing there the system of camp-meetings, which is still popular among the Methodists. After returning to the United States for a time, he repeated his visits to Ireland and England in 1805. He afterwards preached for many years in the United States, traveling all over the country, and sometimes making appointments a year in advance, which he filled at the exact day and hour. His natural eloquence and his eccentricities of dress and speech attracted large audiences everywhere. He preached much against the Jesuits, whom he

regarded as conspirators against civil and religious liberty. His *Polemical Works* appeared in 1814. Among his other writings are *The Stranger in Charleston, or the Trial and Confession of Lorenzo Dow; A Short Account of a Long Travel;* and the *History of a Cosmopolite*—the cosmopolite being himself.

DOW, NEAL, a temperance reformer, b. Me., 1803. He is the author of what is known as the "Maine Law," prohibiting the sale of intoxicating drinks in that state under severe penalties, in operation since 1851. He was a brig.gen. of volunteers in the war for the suppression of the rebellion, and was taken prisoner near Port Hudson in 1863. He is still an uncompromising opposer of strong drink even as moderately used.

DOW'AGER (Fr. *douairière*, from *douaire*, dowry, dower, derived from the Greek and Lat. *dos*, a thing given, verb *do*, to give), a widow with a dower (q.v.); but commonly the title is applied only to the widows of persons of high rank. The queen-dowager, as the widow of the king, enjoys most of the privileges which belonged to her as queen-consort. But it is not high treason to conspire her death, because the succession to the crown is not thereby endangered. Still no man can marry a queen-dowager without special license from the king. Though an alien born, the queen-dowager is entitled, by the common law, to dower after the king's death, though it was not till recently that this privilege belonged to the alien widow of a subject. A queen-dowager, though she should marry a subject, does not lose her regal title, as peeresses-dowager, when commoners by birth, lose their peerages when they marry commoners.

DOW, DOU, or **DOUW,** GERARD, one of the most exquisite of all the Dutch *genre*-painters, was b. at Leyden in 1613. He received his first instructions in drawing from one Dolendo, a draughtsman, and at the age of 15 entered the school of Rembrandt. That marvelous genius for color which the latter possessed, fascinated the young painter, who soon showed a similar mastery over *chiar-oscuro*, but at the same time developed artistic qualities of a wholly different kind from those of his master. The most insignificant incidents of daily life were precious to D., and were delineated with a delicacy, neatness, and care, that could not be surpassed. In his workshop, the utmost cleanliness prevailed. D. was true to nature in a degree positively wonderful. The richness, transparency, vigor, and harmony of his coloring are beyond all praise. In consequence, his pictures, though generally small in size, are considered gems of art, and have brought astonishing prices. One of his best works, "The Dropsical Woman," is valued at 30,000 guilders. Among his other pieces may be mentioned "The Village Grocer," "The Dutch Cook," "The Mountebank," "The Fiddler," "The Dentist," and "The Interior of a Household." His works, which are pretty numerous, are in all the great European collections. D. died at Leyden in 1680.

DOWER (Lat. *dos*, in Domesday, *maritagium*), "in the common law, is taken for that portion of lands or tenements which the wife hath for terme of her life of the lands or tenements of her husband after his decease, for the sustenance of herselfe, and the nurture and education of her children."—*Coke upon Litt.* 30 *b*. Formerly, a widow's right to D. was protected by the law, and could only be defeated by certain prescribed means; but by 3 and 4 Will. IV. c. 105, a husband, by simple conveyance of his land, or by burdening it with debt, may defeat the right of his widow to dower. He may effect the same purpose by introducing into the deed of conveyence to himself, or into his last will and testament, a simple declaration of his intention to bar his widow's right of dower. Though the right of D. has thus lost much of its importance, the history of this right forms an interesting chapter in the English common law. In feudal times, when personal property was small, a widow depended almost exclusively on her right to D. for maintenance after her husband's death. Three things, says lord Coke, 31 *a*, were necessary for D.—marriage, seisin, and the death of the husband. The usual amount of D. was a third of the land in which the husband died seised; but, by custom, as gavelkind (q.v.), it amounted sometimes to a half, and in certain cases to the whole. —*Litt.* s. 37. Besides D. at common law, and D. by custom, three other species of D. are noticed by Littleton—viz., *dower de la plus belle*, s. 47; *dower ad ostium ecclesiæ*, s. 39; and *dower ex assensu patris*, s. 40. The first of these was where a man died possessed of lands held partly by knight's service (q.v.), and partly by socage (q.v.), leaving a child under 14. the widow could be compelled, as guardian in socage, to take her D. out of the socage lands. This species of D. fell with the military tenures by 12 Car. II. c. 24. The last two species of D. mentioned above were both made at the time of the celebration of the marriage. *Dower ad ostium ecclesiæ* was when the husband, being of full age, at the church door specially endowed his wife in the whole or a part of his lands. In *dower ex assensu patris*, the bridegroom's father being alive, the same form was observed, with the sanction and consent of the father. In both of these cases the widow was entitled, on death of her husband, to enter at once upon the land without any assignment. These species of D. were abolished by 3 and 4 Will. IV. c. 105. s. 13. In D. at common law, and D. by custom, which are still suffered to exist, a widow cannot enforce her claim until certain lands have been assigned to her for her D. by the heir or by writ of the sheriff.—*Co. Litt.* 34 *b*. In early times, it was necessary to pay a duty to the lord for this assignment, but this exaction was abolished by Magna Charta. In its general principles, the right to D. in England resembled the right of terce (q.v.) in Scotland. In both countries, the amount allowed by law was a third of the husband's lands, and in

both a certain process was necessary before the widow could enforce her right. A woman forfeits her right to D. by eloping from her husband (13 Edw. I. c. 34), by the treason of her husband, by divorce *a vinculo*, but not by divorce *a mensa et thoro*. The right to D. was also barred by levying a fine (q.v.) of lands, by conveyance to uses in bar of D., and by the settlement of a jointure upon the wife. See FINE, JOINTURE.

DOWER (*ante*), the legal term by which is expressed the prescriptive right of a wife in the estate of her deceased husband. The term is derived from the English common law, the provisions of which, in this respect, have undergone many changes since the ancient days. As a general rule, in the United States, the widow's dower includes a right for life to the use of one third of the lands of which her husband died possessed, and of the profits arising therefrom. A wife may waive her right by the acceptance in lieu thereof of a jointure or some other provision made by will, or she may join her husband in a conveyance of the estate in some form prescribed by law. She may be barred by marital infidelity. In some states, in case of divorce for the husband's fault, the wife takes her dower immediately as if he were dead. The laws on this subject in the different states are far from uniform, and they are constantly subject to change. In some states the right of dower is not merely a right of use, but an estate in fee; in others, dower is barred by judicial sale for the enforcement of a debt or contract.

DOWLAS, a kind of coarse strong linen, used by working-people for shirts, and manufactured largely at Knaresborough in Yorkshire, at Dundee, and at Newburgh and other places in Fifeshire. Since the introduction of calico, the home demand for dowlas has very much diminished, the article being little used except in the iron districts. The principal exports of D. are to Spain, and the countries inhabited by peoples of Spanish origin, in North and South America.

DOWLATABAD' (in English, *Abode of Prosperity*), a strongly-fortified t. of Hindustan, within the Nizam's dominions, near their n.w. frontier, in lat. 19° 57 n., and long. 75° 18' east. The town is commanded by a rock-fortress, which, with a height of about 500 ft., is scarped into a perpendicular for the lowest third of the altitude. This stronghold is all the more formidable from its being completely isolated, being fully 3,000 yards distant from any other eminence. The town of D. has recently greatly decayed, and only a small portion of it is now inhabited.

DOWLER, BENNET, a physician, b. Va., 1797; educated at the medical school of the university of Maryland; settled in New Orleans in 1836, where his professional standing is high. He was for some years the editor of the *New Orleans Medical and Surgical Journal*. He is the author of a *Tableau of the Yellow Fever of* 1853, and of various contributions to the periodical literature of the profession. He founded the New Orleans academy of sciences. He has performed many experiments upon the human body immediately after death, the results of which are deemed valuable.

DOWN, a maritime co. in the s.e. of Ulster province, Ireland. It is 51 m. long, and 38 broad, with an area of 967 sq.m., $\frac{8}{10}$ths being arable, and $\frac{1}{10}$ in wood. It has a coast-line of 67 m., or 125 by the inlets, mostly low and rocky, and with many isles off it. The chief inlets are Belfast lough, 3 m. broad, and 15 deep; Strangford lough, $\frac{1}{2}$ to 3 m by 10; Dundrum and Carlingford bays. The Mourne mountains cover 90 sq.m. in the s., and rise 2,796 ft. in Slieve Donard. The other parts of D are mostly undulating and hilly, with plains and fine meadows along the rivers. The chief rocks are lower Silurian—covering most of the county—and granite, composing the Mourne and Croob mountains. The chief rivers are the Upper Bann and the Lagan. The Newry canal admits vessels of 50 tons, and with the Ulster canal opens communication through almost all Ulster. Thick marl beds occur in the alluvial tracts. The soils are chiefly stony and clayey loams. In 1876, 316,336 acres, out of the total 612,495, were in crop. The chief crops are oats, potatoes, turnips, wheat, flax, and barley. Many pigs are reared. The chief manufacture is linen, especially the finer fabrics, as muslin, woven in the houses of the small farmers. Flax and cotton mills have become common. Hosiery, leather, salt, thread, and woolens are also made. These, with corn, butter, pork, and hides, are the chief exports. D. is among the best cultivated of the Irish counties, and has more resident gentry (almost all Protestants, of English and Scotch descent) than any other Ulster county. It contains 10 baronies, 5 poor-law unions, and 70 parishes. The chief towns are Downpatrick, Newry Newtownards, Bannbridge, and Donaghadee. D. sends four members to parliament, two for the county, one for Downpatrick, and one for Newry. Pop. '71, 277,294, of whom 116,017 are Presbyterians, 88,003 Roman Catholics, 60,868 Episcopalians, and the rest of other denominations. Presbyterianism prevails in the towns and low country, and Roman Catholicism among the mountains, and in the barony of Lecale. D. has many ancient remains, as raths, round towers, castles, and abbeys. On the top of Slieve Croob (1755 ft. high) are 23 stone cairns, one being 54 ft. high.

DOWN'CAST, the name of a shaft used for ventilating mines. The foul air is made to ascend through a flue by a fire burning at the bottom, while fresh air descends through the downcast.

DOWNES, JOHN, 1784–1855, b. Mass.; an American naval officer. He entered the navy in 1802, and was in the frigate *New York* as midshipman during the war with

Tripoli, distinguishing himself by gallant service. He was made a lieutenant in 1807, and served as such on board the frigate *Essex* against the British, under capt. Porter, 1812-14, who assigned him to the command of the cruiser *Essex Junior*. In 1815, he commanded the brig *Epervier*, under Decatur, in the war against Algiers, and assisted in taking an Algerine pirate; also in capturing the Algerine brig *Estido*. In 1817, he was made captain, and commanded the frigate *Macedonian* in the Pacific, 1819-21. In 1828-29, he served in the Mediterranean squadron, and 1832-34 he was with the squadron in the Pacific. In 1837, he was appointed commander of the navy-yard in Charlestown, serving till 1842. He filled the same post again, 1850-52.

DOWNHAM MARKET, a t. in the w. of Norfolk co., on a hillside, on the right bank of the Ouse, 40 m. w. of Norwich, and 10½ s. of Lynn-Regis. It lies amid fen and dairy land. Pop. '71, 2,752. It has a bell-foundry, and a celebrated butter-market. By the Ouse and Cam, vessels proceed from Lynn on the coast to Cambridge, 30 m. above Downham Market. A market was confirmed here in the time of Edward the confessor.

DOWNING, ANDREW JACKSON, 1815-52; b. N. Y.; a pomologist and landscape gardener. In his chosen department he showed a fine taste, and introduced great and lasting improvements, developing a public appreciation of harmonious landscape decoration. He was drowned in the Hudson river when the steamer *Henry Clay* was burned. His works are *A Treatise on the Theory and Practice of Landscape Gardening*, and *Fruit and Fruit Trees of America*, both highly esteemed. He was for a time editor of the *Horticulturist*, published in Albany. A volume of his *Rural Essays*, with a memoir by George Wm. Curtis, was published after his death.

DOWNING COLLEGE, CAMBRIDGE, founded solely by sir George Downing, of Gamlingay park, Cambridge, who, by a will of date 20th Dec., 1717, devised his estates in the counties of Cambridge, Bedford, and Suffolk to various relations in succession, and on failure thereof, to build and found a college on a plan to be approved of by the two archbishops of England and the masters of St. John's and Clare colleges. Owing to various litigations and other difficulties, it was not till 22d Sept., 1800, that the college received its charter, sealed with the great seal, nor till May, 1821, that the buildings were sufficiently advanced to admit of undergraduates residing and keeping terms. The college will consist of a master, two professors (one of law and one of medicine), at least eight fellows, and at least ten scholars; but at first only the master, professors, and three fellows were appointed. In 1878, seven of the eight fellowships had been filled up. Of the eight fellows two must be resident, and of these one must be in holy orders; the resident fellows hold their fellowships for life, but the tenure is affected by marriage; the six non-resident fellows, who are presumed to be persons actively engaged in the studies of law and medicine, hold their fellowships for 12 years. This college has over 60 members of senate, about 70 undergraduates, and above 130 members on the boards.

DOWNPATRICK (mount of Patrick), or DOWN, a parliamentary, municipal, and cathedral town, in the s. of Down, of which it is the capital. It is situated near the mouth of the Quoyle, which flows into the s.w. end of lough Strangford, 74 m. n.n.e. of Dublin, and 21 m. s.s.e. of Belfast, with which town it is connected by railway. The cathedral was restored in 1790 on the site of one built in 1412, and burned in 1538 by lord deputy Grey. A handsome Catholic church was erected here in 1872. Vessels of 100 tons reach the quay a mile from Downpatrick. It has manufactures of linen, soap, leather, and malt liquors. Pop. '71, 3,621, of whom 1630 are Roman Catholics, 1124 Episcopalians, 749 Presbyterians, the rest of other denominations. It sends one member to parliament. To the n.w. of D. are the remains of great earth-works, ¾ m. in circuit, inclosing a conical rath 60 ft. high and 2,100 in circumference. D. was famous before the arrival of St. Patrick, who founded religious establishments here. D. was burned by Edward Bruce in 1315, and plundered by O'Neil in 1552. The holy wells of St. Patrick at Struel, 1½ m. e. of D., were formerly resorted to by Roman Catholic pilgrims from all Ireland, but for the last forty years the pilgrimage has ceased.

DOWNS, THE, an important roadstead or shelter for shipping, off the s.e. coast of Kent, opposite Ramsgate and Deal, between North and South Foreland, and protected externally by the Goodwin sands—a natural breakwater with one to four fathoms water, and often partly dry at low tide. This large natural harbor of refuge is eight miles by six, with an anchorage of four to twelve fathoms, but having many sands and overfalls partly or wholly dry at low water. It is resorted to temporarily by outward and homeward bound vessels, and squadrons of ships of war, and is unsafe only in south winds.—It is defended by Deal, Dover, and Sandown castles.

DOWNS (Ger. *dünen*, Fr. *dunes*, from the root *dun* (q.v.), common to the Gothic and Celtic languages, signifying a *hill*), a term usually applied to hillocks of sand thrown up by the sea or the wind along the sea-coast. It is also a general name for any undulating tract of upland too light for cultivation, and covered with short grass. It is specially applied to two broad ridges of undulating hills s. of the Thames, beginning in the middle of Hampshire, and running eastward, the one (the north D.) through the middle of Surrey and Kent to Dover (about 120 m.), and the other (the south D.) through the s.e. of Hampshire and near the Sussex coast to Beachy head (about 80 miles). Between the two ranges lies the valley of the Weald, from which the chalk strata are supposed to

have been removed by denudation. Towards the Weald, the descent from both D. is rapid, and presents cliffs as of a sea-margin; while the opposite slopes are gradual. The highest point of the north D. is Botley hill, 880 ft.; and of the south D., Ditchelling beacon, 858 feet. These uplands are covered with fine short pasture, which, from its aromatic quality, forms excellent feeding-ground for the famous South Down sheep. The valleys occurring among the hills are usually fertile, and admit of cultivation, so that an excellent field is furnished for mixed husbandry. By pasturing the sheep on the D. during the day, and folding them on the arable fields at night, the latter are highly fertilized.

DOWNTON, a t. in the s.e. of Wiltshire, on the right bank of the Avon, here split into three branches, 6 m. s.e. of Salisbury. It chiefly consists of one long street with the houses irregularly placed. Pop. '71, 3,654. It has a paper-work, and an ancient cross. D., in the middle ages, had a castle, of which the mound or moat remains, and is a singular earthwork, on which Saxon justice was dispensed. Two miles n. of D. is the mansion and estate of Standlinch, the national gift to the heirs of lord Nelson, for which parliament voted £100,000.

DOXOLOGY, a Greek word, signifies an exclamation or prayer in honor of the majesty of God, such as Paul uses at the close of his epistles, and sometimes even in the middle of an argument (Romans ix. 5). The hymn of the angels (Luke ii. 14) is also called a D. by the Christian church; so likewise is the close of the "Lord's Prayer." The so-called "Great Doxology" is simply an expansion of the angelic hymn, and is sung in the Roman Catholic church at the celebration of the Lord's Supper, and at matins. It commences with the words, *Gloria in excelsis Deo* ("Glory to God in the highest"). The ordinary D., "Glory be to the Father, Son, and Holy Ghost, as it was," etc., is repeated at the end of each psalm in the service of the church of England; there is a similar D. in verse to suit different meters.

DOYLE, RICHARD, son of the celebrated caricaturist H. B., whose name was John Doyle, was b. in London in 1826. He became a contributor to *Punch*, and furnished its pages with the well-known sketches of "Ye Manners and Customs of ye English." In 1850, his connection with that publication ceased, and since that period he has employed himself in the illustration of books. Among his works of this nature may be mentioned the *Adventures of Brown, Jones, and Robinson*, and the illustrations to the *Newcomes* and the *Scouring of the White Horse*. He contributed "Sketches of Modern Society" to the *Cornhill Magazine*, and published a Christmas book for 1869, called *In Fairy Land*. His caricatures are all distinguished by the most genial humor, and the most graceful drawing.

DOZY, REINHART, one of the most learned orientalists of the present day, was b. 21st Feb., 1820, at Leyden. He belongs to a family of French origin, which settled in Holland after the revocation of the edict of Nantes. He studied at the university of his native town, and devoted himself especially to oriental studies. In 1850, he was appointed extraordinary, and, in 1857, ordinary professor of history at Leyden. Besides his writings in the *Journal Asiatique* and other periodicals, D. has published *Dictionnaire détaillé des Noms des Vêtements chez les Arabes* (Amst. 1845); *Historia Abbadidarum* (Leyden, 1846–52); and editions of Abdo'l Wáhid al Marrékoshi's *History of the Almohades* (1847); of Ibn-Badrun's *Historical Commentary on the Poem of Ibn-Abdun* (1848), with introduction, notes, glossary, and index, and of Ibn-Adhari's *History of Africa and Spain* (1848–52). In 1849, appeared his masterly performance, *Recherches sur l'Histoire politique et littéraire de l'Espagne pendant le Moyen Age*. A second edition, enlarged and completely recast, was published in 1860. In this work, D. has exposed the gross and willful corruptions of the monkish chroniclers, who persisted in falsifying history for the benefit of Christianity, and who could form no more rational idea of the Moors than that they were "devils," or abetted by the devil, and sent to torment the Spaniards because of their *sins*. Other valuable productions of D. are his *Al-Makkari, Analectes sur l'Histoire et la littérature des Arabes d'Espagne* (Leyd. 1855–61); *Histoire des Musulmans d'Espagne jusqu'à la Conquête de l'Andalousie par les Almoravides* (Leyd. 1861); *Het Islamisme* (Harl. 1863); and *Die Israeliten zu Mekka* (1864).

DRACÆ'NA DRACO, or DRAGON TREE, of the order *liliaceæ*, producing the resin called dragon's blood. Its thickness is greatly out of proportion to its height. The head is crowned with short branches bearing tufts of sword-shaped leaves. Humboldt saw a tree in Teneriffe which for 400 years had measured 45 ft. in circumference. The Guanches worshiped it, and had hollowed its trunk into a small sanctuary.

DRACHENFELS ("Dragon's Rock"), a mountain on the Rhine, one of the range called the *Siebengebirge*, is renowned through Byron's verses commencing

> The castled crag of Drachenfels
> Frowns o'er the wide and winding Rhine

It is situated on the right bank of the river, about 8 m. s.e. of Bonn, and has an elevation of 1056 feet. It is of volcanic origin, consisting of lava, trachyte, and basalt. D. rises abruptly from the river, and is covered with brushwood almost to the top, whence the prospect is magnificent, extending down the river as far as Cologne, and having a charming foreground in Bonn, with its university, and numerous villages and time-worn

castles. The cave where the dragon—from which the mountain takes its name—was wont to abide, is pointed out to the traveler. The ruins of an old castle crown the summit, and add picturesqueness to the Drachenfels.

DRACHMA, DRACHM, DRAM. The D. was a silver coin, the unit of the money-system in ancient Greece. It varied in value in different parts of Greece and at different times. The Attic D. is estimated as equivalent to 9¾*d.* of our money—very nearly a French franc. The Æginetan D. was considerably more. But whatever its absolute worth, it always remained the 6,000th part of the *talent* (about £244), and the 100th part of the *mina* (about £4), and was divided into six obols. There were also coins of two, three, and four drachmas. The D. (originally *a handful*) was also the name of a weight, and 100 drachmas made a mina, in weight, as in money. The weight of the D. is stated at from ¼ oz. avoirdupois to little more than half as much. At this lowest estimate, the mina = 1 lb. nearly. The unit in the monetary system of modern Greece, since 1833, has also been called *drachma;* it is equivalent to $\frac{88}{100}$ of a franc, or about 8½*d.* sterling, and is divided into 100 lepta. In the British system of weights there were, till recently, two drachms or drams: the avoirdupois *dram*—equal to $27\frac{11}{32}$ troy grains—and the apothecaries' *dram* (not now used), equal to 60 troy grains, or ⅛ of an ounce troy. It is this last which is the representative of the ancient drachma.

DRACO, a constellation in the northern hemisphere. The star γ Draconis is celebrated as the one used in determining the co-efficient of aberration of the fixed stars. It is a bright star, nearly in the solstitial colure, and consequently the minor axis of the small ellipse which its apparent place describes in the heavens, lies in the meridian at its transit. Moreover, at the two equinoxes, when its apparent place is at the extremities respectively of this minor axis, it can be observed on the meridian at one equinox about sunrise, and at the other about sunset, so that both observations may be made without the interference of a too bright daylight. These two observations, therefore, are easily taken, and the difference in the north polar distance which they give, is the minor axis of the ellipse described by the apparent place of the star.

DRACO (Gr. *Drakon*), an Athenian lawgiver and archon, who, in the year 624 B.C., was appointed to draw up new laws for the disordered state. These, however, effected little change in the form of the state; but by being committed to writing, put an end to the arbitrary administration of justice on the part of the archons, and resulted in the establishment of a court of appeal—that of the Ephetæ. D.'s legislation had a beneficial and permanent effect upon the political development of Athens. The extraordinary severity of these laws, however, which punished the slightest theft, or even laziness, with death, no less than sacrilege, murder, and treason, caused them to be often neglected, and made them so hated, that Solon was appointed to draw out a new code. Solon, though he softened their severity in most instances, retained that law which punished a murderer with death. D., at a later period, went to Ægina, where, after having introduced his laws, he is said to have been stifled in the theater by the garments thrown upon him as a mark of respect by the people. The severity of his laws gave rise to a pun by Herodicus, who declared that D.'s laws were those of a dragon (Gr. *drakon*) and not of a man. Hence also originated the metaphorical remark of Demades, "that they were written not in ink but in blood." Extremely severe and sanguinary laws are still called *Draconic.*

DRACONTIUM, a genus of plants of the natural order *araceæ*, of which one species, *D. polyphyllum*, a native of Guiana, Surinam, and also of India and Japan, has a powerful action on the nervous system, and is useful in asthma; although at present its chief reputation is the somewhat doubtful one of curing the bite of a snake, to which its mottled stem gives it some resemblance. The flower, when it first expands, emits an intolerable stench.

DRACUT, a t. in Middlesex co., Mass., on the Merrimack, opposite Lowell, with which it is connected with bridges. The town borders on New Hampshire. Agriculture is the main business, but there are also some manufactures of woolens, paper, etc.

DRAFT, an order addressed to a debtor by his creditor, calling upon him to pay a certain sum either to the drawer or to a third party. See BILL, CHECK.

DRAFT, or DRAUGHT, a tentative copy of a legal document, or other formal writing, made for the purpose of adjusting the matter afterwards to be admitted into the fair copy, or engrossed, as it is called. Manuscripts and proof-sheets are the drafts of printed works.

DRAG, a mechanism for slackening the speed of carriages, by operating on one or more of the wheels. The form of D. best known to old travelers by coach is that of the "shoe," a hollow piece of iron attached by a chain to the carriage, which being put below one of the hind wheels, partially reduced the vehicle to the quality of a sledge: by which dragging process the carriage was suitably retarded on going down-hill. As the shoe-drag required to be applied and removed with some inconvenient detention of the vehicle, a step was made in advance when a method of retarding a wheel without detention was discovered. This new process, which is known as the patent drag, consists of a connected piece of mechanism, altogether operated upon by the driver without moving from his seat. A handle affects a series of rods and levers by which a species

of shoe is pressed against one of the wheels, so as to slacken its motion. Such is the kind of drag now very generally attached to gentlemen's traveling-carriages, omnibuses, and other vehicles for passengers on the roads of Great Britain. It is of French origin. Applied in either form, the use of the drag, independently of its safety, is to allow horses to continue running at ordinary speed down-hill without being unduly pressed on by the carriage behind them. A similar contrivance, but of a more powerful kind, called a *break* or *brake*, is applied to arrest the motion of railway-trains, See RAILWAYS.

DRAGOMAN, from the Turkish *trukéman*, the general name given in Turkey to an interpreter, or to a guide to foreigners. The common dragoman corresponds exactly to the Italian *cicerone*, or the French *commissionaire* or *valet de place*. There are several connected with the hotels at Constantinople and other Turkish cities, who pounce eagerly upon European travelers, to perform every imaginable service. The diplomatic dragomen are, however, important personages, being the medium of communication between the Christian ambassadors and the sublime porte. Though usually natives, they and their families enjoy the privilege of being under the protection of the embassy they serve, and are subject to the laws of the country of that embassy, and not to the Turkish law. This privilege, which is also enjoyed by all the subjects of the great Christian powers resident in Constantinople, etc., is much valued, on account of the greater severity of the Turkish laws, and the summary manner in which they are executed. These dragomen are mostly of Italian extraction, either descendants of the old Genoese and Venetian merchants, or Maltese. Strange stories are told of their tricks in garbling the communications they have to make, when private interests can be served by such means, and bribes obtained; and there is no doubt that newly appointed consuls, quite ignorant of the Turkish language, are in some respects almost completely in their power, and that this power is frequently used very unscrupulously.

DRAGON, a name applied in modern natural history, both popularly and by scientific authors, to different kinds of saurian reptiles. Some of these (the genus *draco* of Linnæus) are remarkably characterized by false ribs extending from the sides, so as to support a membrane which is used as a parachute. These are called flying dragons (q.v.), or flying lizards. Another reptile which has received the name D., and is also called D. LIZARD *ada*), belongs to a family of saurians, *teyidæ*, found only in America, closely allied to the *varanidæ* of the old world, and to which, in common with them, the names MONITOR and SAFEGUARD have sometimes been given, in consequence of their being supposed—although erroneously—to give warning by a hiss of the proximity of a crocodile or alligator. It inhabits the marshy plains of Guiana, climbs trees with facility, bites severely, has a long compressed tail, the back and tail crested, the tongue forked like that of a serpent, and attains a length of about 6 feet. Both its flesh and eggs are used as articles of food.

DRAGON. In the mythical history and legendary poetry of almost every nation, the D. appears as the emblem of the destructive and anarchic principle, as it manifests itself in the earlier stages of society—viz., as misdirected physical power and untamable animal passion. Like the erpent, the D. is always a minister of evil, of the principle which aims at negation, opposition, and contradiction, the object of which is to fight against order, harmony, and progress. But whilst the serpent seeks the attainment of its object by cunning and deceitful artifices—crawling on its belly, and always assuming ostensibly characteristics the very opposite of its own—the D. proceeds openly to work, running on its feet, with expanded wings, and head and tail erect, violently and ruthlessly outraging decency and propriety, spouting fire and fury from both mouth and tail, and wasting and devastating the whole land. The destruction of this disorderly element was one of the first objects of human energy, but it was an object which was unattainable by merely human means, and mankind were accordingly indebted for its accomplishment to that intermediate class of beings known as heroes in classical antiquity. As the highest ideal of human strength and courage, the task properly fell to Hercules; but it was not confined to him, for we find both Apollo and Perseus represented as dragon-slayers. From legendary poetry, the D. passed into art, some of the earliest efforts of which probably consisted in depicting it on the shield, or carving it for the crest of a conqueror's helmet. The D. does not seem to have been a native emblem with the Romans, and when they ultimately adopted it as a sort of subordinate symbol, the eagle still holding the first place, it seems to have been in consequence of their intercourse with nations either of Pelasgic or Teutonic race. Amongst all the new races which overran Europe at the termination of the classical period, the D. seems to have occupied nearly the same place that it held in the earlier stages of Greek life. In the *Nibelungen Lied*, we find Siegfried killing a D. at Worms; and the contest of Beowulf (q.v.), first with the monster Grendel, and then with the D., forms the principal incident in the curious epic which bears the name of the former. Even Thor himself was a slayer of dragons (J. Grimm, *Deutsche Mythologie*, ii. 653). Among the Teutonic tribes which settled in England, it was from the first depicted on their shields and banners; and Dr. Plott, in his History of Oxfordshire, ascribes the origin of the very ancient custom of carrying the D in procession at Burford, in great jollity, on midsummer eve, to the fact of a banner adorned with a golden D. having been taken by a king of the West Saxons from a king of Mercia. The custom, however, is said by Brand, on

the authority of Aubanus, to have prevailed in Germany, and was probably common in other parts of England (Brand's *Pop. Antiq.*, i. 321). Nor was the D. peculiar to the Teutonic races. Amongst the Celts, it was the emblem of sovereignty, and as such borne as the sovereign's crest. Mr. Tennyson's *Idylls* have made every one familiar with "the dragon of the great pendragonship," blazing on Arthur's helmet, as he rode forth to his last battle, and "making all the night a stream of fire."

The fiery D., or drake, and the flying D. in the air, were meteoric phenomena, of which we have frequent accounts in old books, and, indeed, as Brand remarks, "the dragon is one of those shapes which fear has created to itself," and which appears in circumstances, and clothes itself in forms, as various as our fears.

In Christian art, the D. is the emblem of sin, the usual form that is given to it being that of a winged crocodile. It is often represented as crushed under the feet of saints and martyrs, and other holy personages. Sometimes its prostrate attitude signifies the triumph of Christianity over paganism, as in pictures of St. George and St. Sylvester; or over heresy and schism, as when it was adopted as the emblem of the knights of the order of the D. in Hungary, which was instituted for the purpose of contending against the adherents of John Huss and Jerome of Prague.

The D. is often employed in heraldry; and other animals, such as the lion, are sometimes represented with the hinder parts resembling dragons. An animal so represented is said to be *dragonné*. See GRIFFIN. A D. without wings is called a lindworm, or lintworm, which Grimm (*Deutsche Mythol.*, ii. 652) explains to mean a beautiful or shining worm.

DRAGON, GREEN, *Dracunculus vulgaris*, a plant of the natural order *araceæ*, which receives its name from its spotted stem. It is a native of the s. of Europe. Its flowers are black, remarkably fetid, and give out exhalations which cause headache, giddiness, and vomiting. The root is emetic, and, probably for no better reason than the peculiar appearance of the stem, has been supposed useful for curing serpent-bites.

DRAGONET, *Callionymus*, a genus of fishes of the goby (q.v.) family (*gobiadæ*), remarkable for having the gill-openings reduced to a small hole on each side of the nape, and the ventral fins placed under the throat, separate, and larger than the pectorals. They have no air-bladder. The species are pretty numerous; most of them finely colored, as the GEMMEOUS D. (*C. lyra*) of the British coasts—called *gowdie* (*gowd*, gold) in Scotland=a fish about 10 or 12 in. long, the prevailing yellow color of which is varied with spots of sapphirine blue, etc.

DRAGON-FLY, *Libellula*, a Linnæan genus of neuropterous insects, now constituting the family *libellulidæ*. They are in general very beautiful, rivaling butterflies in their hues, and like them loving the sunshine. They are, however, easily distinguished from butterflies, even at a distance, by their more slender form and comparatively narrow gauze-like wings; and differ from them still more widely in their habits, as they do not feed on the nectar of flowers, but prey on other insects, which they pursue with rapid flight. Dragon-flies have a large head; the mouth is formed for mastication, and its parts, especially the mandibles, possess great strength.—See the article COLEOPTERA for an explanation of the structure of the mouth in *masticating* insects, and the names of its parts.—The antennæ are short, awl-shaped, and of few joints. The eyes are large, lateral, and projecting. The wings—four in number—are equal in size, or nearly so, long, very thin, and very much reticulated. The legs are short. The abdomen in some is compressed, in others slender and cylindrical, in some remarkable for its extreme slenderness. The French name *demoiselle*, given to these insects, seems to be due to their beauty. They are, however, equally remarkable for their voracity. The great dragon-fly (*aeshna grandis*), an insect about 4 in. long, the largest of the British species, has been seen to dart upon a large cabbage-butterfly which passed as it was flitting up and down in search of prey; and then settling on a twig, it bit off the wings, and in less than a minute devoured the body.

Dragon-flies are usually most abundant in the vicinity of lakes, rivers, and marshes. They deposit their eggs in water, and the larvæ and pupæ are entirely aquatic, living chiefly at the bottom of the water, and creeping on the submerged parts of aquatic plants. They are as ravenous as the perfect insect, which in general form they pretty much resemble; aquatic insects are their food. The pupæ, unlike those of the greater number of insects, are active. They are provided with the means of drawing water into their bodies to supply air for respiration, and expel it again by the same orifice at the extremity of the abdomen, with such force, that they thus propel themselves through the water, whilst their legs are at rest. When the final transformation is about to take place, the dragon-fly pupa crawls out of the water on a stick, rush, or other object; fixes itself by hooks, with which its legs are furnished; and the skin then splitting at the back, the perfect insect comes forth, but with body and wings quite soft and moist, and the wings still folded up into small compass. In the sub-family of *agrionidæ*, the wings are elevated vertically in repose: in the true *libellulidæ* (*libellula aeshna*, etc.), they are extended horizontally.

Dragon-flies extend even into very northern regions, but are most abundant in warm climates.

DRAGONNADES, the name applied to a series of religious persecutions which took place in France in the reign of Louis XIV. and that of his successor, and which were intended to compel the Protestants of that country to renounce their religion. They consisted of armed expeditions, led by a bishop, an intendant, a sub-delegate, or a priest, who marched through the provinces, demanding of the heretics that they should abjure their faith, and leaving such as were refractory to be dealt with by the unscrupulous troops. Foremost among the armed force rode dragoons, who, from the fact of their taking the precedence, and also from the merciless treatment to which they subjected the Protestants, had the unenviable honor of giving a name to the persecutions. Louis XIV., who had been entirely misinformed as to the means employed in the D. by the courtiers and fanatics who surrounded his throne, was delighted to find that from 250 to 400 Protestants were daily being received into the bosom of the church, and in consequence, on the 22d Oct., 1685, a few months after the date of the first of the D., he revoked the edict of Nantes (q.v.), that the good work might be fully accomplished.

DRAGON ROOT, *Arisæma atrorubens,* formerly *arum triphyllum,* a plant of the natural order *araceæ,* a native of North America, the tuber of which is a powerful local irritant, and is used as a stimulant of the secretions in chronic bronchitis, asthma, rheumatism, etc. The powder, made into a paste with honey, is beneficially applied to the mouths and throats of children in aphthæ; and milk, in which the root has been boiled, is a useful ointment in cases of scalled head, ringworm, etc.

DRAGON'S BLOOD, sometimes called gum dragon, an astringent, resinous substance, obtained from several trees of different natural orders, natives of warm countries. The greater part of the D. B. of commerce is probably the produce of *pterocarpus draco,* a large South American tree of the natural order *leguminosæ,* suborder *papilionaceæ,* which at some seasons appears as a magnificent mass of yellow blossom. A similar substance is yielded in the East Indies, by the red sandal-wood tree (*pterocarpus santalinus*); and *dalbergia monetaria,* a tree of the same order, yields it in Guiana. Mexican D. B., used in Mexico as a vulnerary and astringent, is obtained from *croton draco* (see CROTON), of the natural order *euphorbiaceæ.* The best kind of all is supposed to be produced by *calamus draco,* an East Indian palm, and part of it is said to be obtained from the fruit of the palm.—D. B. exudes from the surface of the leaves, and from cracks in the stem of the DRAGON TREE (*dracæna draco*), a tree of the natural order *liliaceæ,* remarkable for the size which it sometimes attains, rivaling even the baobab, and of which a celebrated specimen near Orotava, in the island of Teneriffe, was found by Humboldt in 1799 to have a stem about 45 ft. in circumference, and is described as having been of similar gigantic size in the beginning of the 15th century. The stem of the dragon tree is, however, generally short in proportion to its thickness, and its head consists of numerous short branches, terminating in tufts of sword-shaped leaves. It is not supposed to yield any of the D. B. of commerce.

D. B. is opaque, of a deep reddish-brown color, brittle, smooth, with a shining shell-like fracture, and when burned, emits an odor resembling that of benzoin. It is nearly insoluble in water, but is soluble in alcohol, and the solution will permanently stain heated marble, for which it is often used, as well as for staining leather and wood. It is also soluble in oils and turpentines, and enters into the composition of brilliant and much-esteemed varnishes. It was formerly employed in medicine, but is now almost out of use.—An astringent resin obtained from the *eucalyptus resinifera* of Australia is there called dragon's blood.

DRAGON'S MOUTH, or, in Spanish, BOCA DEL DRAGO, is the name of two straits or passages in the new world. One of them is in South America, separating Trinidad from the mainland, and connecting the gulf of Paria with the s.e. extremity of the Caribbean sea. The other is in Central America, being on the n.e. coast of Veragua, the most north-westerly portion of New Granada, and it communicates between the Caribbean sea and lake Chiriqui.

DRAGOON. From the old fable that the dragon spouts fire, the head of the monster was worked upon the muzzles of a peculiar kind of short muskets which were first carried by the horsemen raised by marshal Brissac in the year 1600. This circumstance led to their being called dragoons; and from the general adoption of the same weapon, though without the emblem in question, the term gradually extended itself till it became almost synonymous with horse-soldier. Dragoons were at one time a kind of mounted infantry, drilled to perform the services both of horse and foot. At present, *dragoon* is simply one among many designations for cavalry, not very precise in its application. In the British army, the *heavy* dragoons and the *light* dragoons are carefully distinguished in regard to the weight of the men, horses, and appointments. The first dragoons in the army were the Scots greys, established in 1683.

In the British army there are at present 7 regiments of "D. guards," and 21 regiments of "dragoons," besides the 3 cuirassed regiments of household troops. See HORSE GUARDS.

DRAGUIGNAN, a t. of France, in the department of Var, on a tributary of the Argens, about 40 m. n.e. of Toulon. It is charmingly situated, in the midst of a valley surrounded by hills, the slopes of which are covered with vineyards and olive plantations.

It is tolerably built; and its streets are adorned with numerous fountains and trees. Its principal structures are the prison, the court-house, a hospital, and a stately clock-tower. It has manufactures of coarse woolens, leather, hosiery, silks, soap, brandy, oil, and earthenware. Pop. '76, 8,029. D. is an ancient place. During the middle ages it was strongly fortified. The fortifications were destroyed in the civil wars, but were reconstructed in 1615.

DRAINAGE, in husbandry, is the art of carrying off water from the soil and subsoil of land by means of open or closed drains or trenches—the term, however, is generally understood to apply to closed drains. By its means, the fertility of wet land has been greatly increased. When the drains are put in every 6 or 10 yards, it is called *furrow* or *frequent* draining.

The vast amount of capital which has been expended in D. within a quarter of a century, attests its utility and necessity. Before the introduction of furrow draining, stiff and tenacious clays were of comparatively little value. They were cultivated at much expenditure of labor, and the crops which grew upon them were influenced to a great extent by the variations of the seasons. A system by which wet and worthless land could be rendered dry and valuable, was an improvement so patent to practical men, that we need not wonder at its general adoption.

D. by open ditches was no doubt the first mode of freeing land from superfluous water. The Roman agricultural writers mention the good results arising from covered drains, which were formed of wood and other substances, which served so far to render the land dry. More than a century ago, a large extent of clay-land was drained at narrow intervals in Norfolk and Essex, by putting in brush-wood and even straw in the bottom of the drains. The progress of draining, which is now regarded in many soils as essential to economic culture, was slow and partial, until Mr. Smith of Deanston (well on in the 19th c.) reduced the practice to a system, and showed the principles upon which its efficiency depended. Through the exertions of this advocate, furrow draining soon became a *sine quâ non* in the culture of clay-soils, or indeed any soil, in moist climates.

Practical men consider the line of greatest fall, or quickest descent, as the best for cutting drains in a field. The smaller drains are usually conducted into larger or *main* drains, instead of each discharging its quota of water into the open ditch. This is rendered necessary, as the mouths of the smaller drains would be more liable to be choked up by the growth of weeds; while the collecting of water into main drains secures a fuller flow to sweep out any matters which might accumulate where the discharge was small. Moreover, the less of the action of the air in the drains, the more efficient they are.

The most efficient, and at the same time cheaply cut drain, is made so that a pipe of a cylindrical form may be laid along the bottom, which need be of no greater width than what is necessary to allow of the pipes being properly laid.

Drains of this form are cut with a set of spades which are of different widths—the broader being used for taking out the top, and the narrowest for the bottom. The one which cuts the last spit is called the *bottoming tool*, and its introduction has effected a considerable saving in cutting drains. The pick has often to be used, too, where the subsoil is hard. The cutting of drains is heavy, crushing work. Men employed at this sort of labor are generally paid by the piece; and a professional will make rather above the ordinary rate of laborer's pay. One not accustomed to drain-cutting finds it for some time very hard labor; but experienced hands prefer draining to trenching.

Before the general use of pipes, stones were the common materials with which drains were formed. Mr. Smith recommended that they should be broken so small, that they might pass through a ring two inches and half in diameter. From nine inches to a foot in depth was the quantity which was commonly put in. Where stones can be easily got, they are still preferred to tiles, as cheaper, and if well put in, more efficient and durable. The best plan is to set a pretty large block at each side of the bottom of the drain, and then use a third as a sort of wedge. A coating of smaller stones is surmounted by some turf and the muck.

When tiles and pipes were first used, it was even thought necessary to have some gravel, or small stones, placed above them in the drains, for the purpose of enabling the water to find its way into them. It was soon found, however, that tile drains were quite as efficient without any stones or gravel; and that they were less liable to be choked up, as the clay or earth acted as a filter in preventing the intrusion of any kind of solid matter.

Many kinds of tiles and pipes have been tried, but the cylindrical form is most used. At one time, a bore in the tile of an inch in diameter was thought sufficient, but 2-in. tiles are now preferred. They are usually made about 15 in. in length. The continuity of the drain is maintained completely by *collars*, which should always be used as a means for securing efficiency and permanency. In soft mossy or clayey subsoils, semi-cylindrical tiles called muggs have been laid, with the bend up, on lath. This is expensive, but is necessary in some cases.

Much discussion has taken place in regard to the proper depth of drains, as well as the distance at which they should be placed. Mr. Smith at first advocated the making

of drains from 2½ to 3 ft. deep, and at intervals of from 10 to 40 ft., according to the nature of the land. Experience, however, has been gradually favoring deeper drains, at wider intervals. Even on the most tenacious soils with subsoils of *till*, few now think of having drains less than 3 ft. in depth, though the distance apart should not in many cases be more than from 15 to 18 feet. The depth, however, depends greatly on the soil—3½ and 4 ft., with the leader drains 6 in. more, are common dimensions. In mossy land the depth has sometimes to be 7 feet. The width between drains depends on the wetness of the land and the character of the subsoil.

The mere tenacity of clays is not the element which determines the depth of drains, or the distance at which they should be placed apart. It is now well understood that the success of draining by pipes depends upon the fissures which are produced in the subsoil by the droughts of summer never entirely closing up; and thus minute channels are formed, which lead the water into the drains. As the properties of clays become better understood and classified, practical men come to be more at one in regard to this important point connected with the economy of drainage.

The principal advantages of D. are, the deepening of the staple soil, and rendering it more friable, so that a superfluity of water, which would cause the formation of those chemical compounds that are found in stagnant water, is prevented. The greater depth of mold, and more perfect culture, render the soil more absorbent of moisture in dry weather. As crops can usually be sown sooner on drained lands, they also ripen earlier, and produce more abundantly. In short, while drained land obtains a greater capacity for moisture and manure, it imparts to plants greater capabilities for economically working up the materials which they find in the soil and atmosphere, seeing they are maintained in the most healthy conditions of growth.

D. in its various forms has, as is well known, not only improved the fertility and value of land in Scotland, but materially changed the aspect and climate of the country. Mosses and wet rushy lands have been transformed into dry and productive fields, while by the removal of all superfluous pools, the air is freed from those hovering vapors which are injurious to general amenity and salubrity. To the farmer, the more immediate advantage of D. consists in that rapid running off of the water which falls as rain, so as to admit of working lands without any undue delay, while natural springs and dampness, from whatever source arising, are also run away with wonderful success. In short, subsoil D. has been perhaps the most valuable improvement connected with British agriculture.

DRAINAGE-TUBES, in surgery, are a recent but important addition to the surgical appliances for which this profession is indebted to a distinguished French surgeon, M. Chassaignac. They are composed of India-rubber, from ¼th to ⅜th in. in diameter, perforated with numerous holes, and of various lengths. They are especially useful in chronic abscesses (which it may be unadvisable to empty at once) and empyema (q.v.), but also in large wounds, such as those made by amputation, and in all cases where there is apt to be a deep accumulation of discharge. They are introduced in such a manner that one end is on a level with, or projects above the skin; the other is in communication with the seat of discharge; and by allowing that discharge constantly to escape from the external wound, they diminish both chemical irritation from putrid accumulation, and mechanical irritation from pressure. Like all new inventions, it has its advocates and opponents. Thus, while sir William Paget, in his article "Sinus and Fistula," in Holmes's *System of Surgery*, says that "*drainage*, for which the perforated caoutchouc-tube of M. Chassaignac is a very happy invention, is applicable to a great number of cases; but chiefly to those in which a sinus or incomplete fistula depends mainly on pus collecting at a level below or distant from the aperture of discharge, or more generally, when pus is apt to be retained."—Sir William Paget's surgical colleague at St. Bartholomew's hospital, in his article "Abscess," which immediately precedes that from which we have just quoted, objects to the drainage-tube on the grounds that, as a foreign body, it sets up irritation, and adds that "if a proper opening be made, there can be rarely any occasion for a drainage-tube; and however carefully it is inserted, it must of necessity inconvenience and distress the patient." Notwithstanding Mr. Coote's objections, drainage-tubes are now very generally used in surgical practice.

DRAKE, DANIEL, 1785–1852; a physician; b. N. J.; graduated at the university of Pennsylvania, 1816. In 1818, he founded a medical college in Cincinnati; also a commercial hospital. In 1823, and following years, he was professor in medical colleges in Philadelphia, Louisville, and Cincinnati. He wrote *An Historical and Scientific Account of Cincinnati;* and *A Systematic Treatise, historical, etiological, and practical, on the Principal Diseases of the Interior Valley of North America, as they appear in the Caucasian, African, Indian, and Esquimaux varieties of its Population.*

DRAKE, Sir FRANCIS, was b. about the year 1539, in a cottage on the banks of the Tavy, in Devonshire. His father was a yeoman, and had a family of twelve sons. He was a zealous Protestant, and during the persecution under queen Mary, he fled from Devonshire into Kent, in which co. his family was brought up. He obtained some kind of clerical appointment among the sea-faring men of the district, and in consequence, D.'s younger years were passed among sailors. He was at an early age apprenticed to

a neighbor of his father's, who possessed a bark, and occasionally made voyages to Zealand and France. When his master died, D. fell heir to the vessel, and carried on the old trade with considerable success. While coasting about, he heard of the exploits of Hawkins in the new world, and the recital took such a hold of his imagination, that selling his ship, he proceeded to Plymouth, and joined Hawkins in his last expedition to the Spanish main. The adventure was disastrous to all concerned, and D. came home much poorer than when he set out. Undismayed, however, he gathered around him wild and reckless spirits, and having raised sufficient money, they fitted out a vessel, and under the command of D., made several voyages to the West Indies. In 1570, he obtained a commission from queen Elizabeth, and cruised in the West Indies, enriching himself with plunder. In 1572, he again sailed for the Spanish main, and, assisted by some other English ships, he plundered the town of Nombre de Dios. He then crossed the isthmus of Darien, and beholding the Pacific, prayed God to grant him leave to sail an English ship in that sea. On Sunday, the 9th Aug., 1573, he came into Plymouth laden with spoil; and when the news spread of his arrival, the people forsook the preacher, and came out to gaze on the brave and successful sea-rover.

Under the sanction of queen Elizabeth, D. again set sail in 1577, taking with him five vessels. He sailed to South America, and plundered the coasts. In Sept. of that year he entered the Pacific. During his voyage, he was singularly successful. He sacked the Spanish towns on the coasts of Chili and Peru, and he captured a royal galleon laden with plate. He then steered for the n.e., hoping to find a passage back to the Atlantic; but the severity of the cold discouraged his crew, and he took shelter in Port San Francisco. He stayed there several weeks, and formally took possession of the country in the name of the queen of England. He then steered across the Pacific for the Moluccas; reaching Ternate, he sailed for Java, thence he stretched right across the Indian ocean for the cape of Good Hope, which he doubled in safety, and arrived at Plymouth on Sunday, the 26th Sept., 1579. He was graciously received at court. Elizabeth banqueted on board his vessel, and conferred on him the honor of knighthood.

During part of 1585 and the whole of 1586, D. was employed, with a fleet of 21 ships, against Philip II. of Spain, chiefly in the West Indies and the coasts of South America. In this, as in his former voyages, he plundered many towns, and enriched himself with spoil. During this voyage, he visited Virginia, which colony had been recently planted by Raleigh. Thence he returned home, and it is said brought tobacco with him.

Spain was now preparing an armada for the invasion of England, and Elizabeth sent D. with a fleet of 30 sail to destroy the enemy's ships in their own harbors. He entered the roads of Cadiz, passed the batteries on the morning of the 19th April, 1587, and before night, destroyed 100 vessels, and possessed himself of immense booty. He then sailed along the coast, burning and plundering. He entered the Tagus, and flouted the marquis Santa Cruz, who was lying in that river with a large force of galleys. Having done all the mischief in his power to Spain, D., with that keen appetite for plunder which never forsook him, steered for the Azores, on the look-out for homeward-bound treasure-ships. He was fortunate enough to encounter a richly laden carrack, of which he took possession. On his return, he spent a considerable portion of his prize-money in supplying the town of Plymouth with water.

D. was next employed as vice-admiral in the fleet under lord Howard, which scattered the armada, and broke the naval supremacy of Spain. In 1589, he was sent to Portugal with a fleet, to expel the Spaniards, who had taken possession of that kingdom; but the expedition was unsuccessful. On his return, he was elected member of parliament for Plymouth. In 1595, along with sir John Hawkins, he was sent with a fleet to the West Indies. In the course of the expedition, the commanders quarreled. Hawkins died before reaching Puerto Rico. Attacking the place, D. received a repulse. Sailing away, he burned and plundered several towns. He came to anchor in Nombre de Dios, where a deadly disease broke out among the soldiers and sailors of the fleet. D. was at last smitten, and after struggling 20 days with the malady, he expired on the 27th Dec., 1595. On the day of his death, the fleet anchored at Puerto Bello, and there the bold sailor and buccaneer received his sea-funeral.

DRAKE, FRIEDRICH, a celebrated German sculptor, b. at Pyrmont, 23d June, 1805, and trained under Rauch of Berlin. Among his principal works are a "Madonna with her Infant" (purchased by the empress of Russia), a "Dying Soldier," a "Vintager," "The Eight Provinces of Prussia" (colossal allegorical figures, adorning a hall in the royal palace at Berlin), and a "Warrior crowned by Victory," which is reckoned one of the masterpieces of Prussian sculpture. But D. owes his celebrity chiefly to statues, busts, and medallions. There are few great countrymen of his of whom he has not preserved a marble memorial. His statues of Schinkel, the two Humboldts, Rauch, Justus Moeser, his bust of the naturalist Oken, his two colossal statues of Frederick William III., king of Prussia, and that of the emperor William I. at Cologne, deserve especial mention; as also the busts of Bismarck and Moltke, and the figure on the victory column at Berlin. D. is professor of sculpture in the academy of fine arts at Berlin.

DRAKE, JOSEPH RODMAN, 1795–1820; b. N. Y.; one of the early American poets. He studied medicine, graduated, and married a daughter of Henry Eckford, the ship-builder, an alliance which raised him from poverty to affluence. In 1816, he wrote *The Culprit Fay*, a highly imaginative poem. In 1818, he was in Europe. The next year, in conjunction with Fitz-Greene Halleck, he wrote poetical satires for the *New York Evening Post*, over the signature of "Croaker and Co." He is best known as the author of *The American Flag* (of which Halleck is said to have contributed the last four lines), which many critics consider to be our best national poem.

DRAKE, SAMUEL GARDNER, 1798–1875; b. N. H.; in early life a school-teacher. In 1828, he established in Boston an antiquarian bookstore, the first of the kind in the country. He was one of the founders of the New England historical and geological society, of which he was president in 1858. In 1847, he started a quarterly *Register*, of which he was for many years the editor. Among his publications are a number of books on Indian history and wars, on genealogy, and on witchcraft; but the most important is his very full *Dictionary of American Biography, including Men of the Time*, containing 10,000 notices of persons of both sexes, of native and foreign birth, who have been remarkable or prominently connected with the arts, sciences, literature, politics, or history of the American continent.

DRAMA (Gr. *drama*, from *draō*, I act), or dramatic poetry, in it most general signification, represents *actions*, which are not stately narratives, as in epic poetry, or which do not aim at the musical expression by language of mental emotions, as in lyric poetry. The D. consists of an impersonal representation, by the dramatist, of an animated conversation of various individuals, from whose speech the movement of the story is to be gathered. Thus, it is contrasted, on the one hand, with dialogue, or the dull and changeless flow of discourse, and on the other, with every other species of poetry, whether epic or lyric. In simple dialogue, the minds of the speakers remain unchanged; in the D., the movement of the thoughts is so lively, and the expectation of the issue so vivid, that this species of poetry surpasses every other in interest and in intensity. In epic poetry, persons are frequently introduced engaged in lively conversation, and this is sometimes the case even in lyric poetry, but the prevailing tone of the epopee is descriptive and indirect. A novel, or an epic poem, can only be described as dramatic when it abounds in animated conversations, or when direct action prevails over description. All dramatic poety may be divided into *tragic* and *comic*. Tragic poetry has for its aim to interest the earnest mind, while comic poetry merely endeavors to produce amusement. Tragic poetry may be described as that which interests the mind in the highest degree possible, and comic poetry as that which engages it in the most complete lawlessness. In comedy, gloom, sadness, sobriety have no recognized existence; while in tragedy, gayety, joviality, riotous mirth are unknown.

While the D., doubtless, arose from that natural love of imitation peculiar to man, and from the child-like liveliness with which a simple narrator loves to recount anything which he has heard or seen, yet the creation of dramatic composition was, nevertheless, a feat of singular boldness. This arises from the wide difference there is between the disjointed elements of occasional imitation and the perfect invention of the genuine drama. The Old Testament, no doubt, contains numerous instances of dramatic dialogue, as in the book of Job; and of lyric poems placed in a dramatic connection, as Solomon's Song; but there is no instance in Hebrew literature of the existence of the D. properly so called. The Hindus have an early dramatic poetry, but, unfortunately, this poetry only dates back to a time when the intercourse between Greece and India was close and frequent. It is to Greece alone that we, accordingly, must look for the invention of the D., and to Athens, in particular, for its perfection. But even here it was originally exhibited only at a few festivals of a single god, Dionysus. There can, then, be no doubt that the origin of the D. is to be sought for in the enthusiasm attendant on the worship of Bacchus. The ancient Greek writers tell us that the D. originated in a choral song; and Aristotle (*Poet.* 4), that it had its origin in the singers of the dithyramb. Supposing that it originated in the pantomimic dances, the dramatic art, like every other, was only slowly purified from extraneous mixtures. Even the origin of the word tragedy has been disputed, although the inventor of it, Arion (580 B.C.), the celebrated dithyrambic poet, is known. Tragedy (*tragōdia*, from *tragos*, a goat, and *ōdē*, a song) is said to have taken its rise from the fact of the old dramas being exhibited when a goat was sacrificed, or because a goat was the prize, or because the actors were clothed in goatskins. Comedy, again (*kōmōdia*, either from *kōmos*, a revel, or *kōmē*, a village), signifies, literally, either the *revelers' song* or the *village song*, from the practice of strolling-players publicly exhibiting their dramatic skill about the streets. Thespis (536 B.C.) introduced the regular dialogue into the choral representations, and joined a person to the dithyrambic songs, who was the first actor. Phrynichus (512 B.C.) used this single actor of Thespis for the representation of female characters, although with him the lyric element predominated over the dramatic. No further improvement of any note was introduced into tragedy before the time of Æschylus.

Comedy, again, arose about 580 B.C., with Susarion, who traveled about through Greece, ridiculing, from a small movable stage, the follies and vices of his time. Tragedy, from its first recognition, was deemed worthy, by reason of its superior

gravity and staidness, to entertain the refined inhabitants of cities; while comedy, at the outset, from its riotous fun and jollity, was judged more in harmony with the rustic habits of the country people. In time, comedy made its way into the city, and Epicharmus (485 B.C.), besides modeling this form of dramatic wit, after its more successful rival, tragedy, likewise introduced a number of distinguished comedians to the notice of the Athenians. Phormes, Magnes, Crates, Cratinus, Eupolis, Pherecrates, and Aristophanes are the highest names in connection with the old Greek comedy, the last mentioned being, however, by far the greatest. Tragedy, both from its ideal character, and from the stately cothurnus and long masks in which the actors of it appeared, aimed at a representation of what was dignified, noble, and grand in human nature. Comedy, again, from its style of caricature, its low-heeled sock, and its grotesque masks, tried to degrade humanity beneath its natural level. Comedy, during the Greek period of its history, divides itself into three forms, viz.: old comedy, middle comedy, and new comedy. The old comedy is the directly opposite of tragedy; its form is essentially sportive, and a seeming aimlessness reigns throughout it. It is, in the opinion of A. von Schlegel (*Lectures on Dramatic Literature*), the only genuine poetic species of comedy, while the other forms of it show a tendency to decline into prose and matter of fact. In the new comedy, again, the form is rather serious than otherwise, and it is regularly tied down to the accomplishment of a certain aim. This is what is understood by comedy at the present day. It is a mixture of tragedy and comedy proper, of earnestness and mirth. Only fragments of Menander and of Philemon, the genuinely witty poets of the new comedy, have come down to us. The middle comedy, again, which came in between the old and the new, arose after the termination of the Peloponnesian war. The new oligarchy strictly prohibited the introduction of living persons by name on the stage; and the chorus, till then the chief instrument of vituperation, is said to have been abolished.

With Æschylus, Greek tragedy properly begins. He instructed his actors himself in the rehearsal of his pieces. In his dramatic compositions he aimed more at sublimity than beauty, more at the heroic than the human. Sophocles, again, who was, perhaps, superior to Æschylus in his appreciation of human nature, strove more to depict idealized men than to paint heroic excellence. He introduced a third actor on the scene, and materially improved the mechanism of the stage. Euripides was too much of a nice speculator to attain to the highest forms of poetic expression. Instead of quietly contemplating life as Sophocles did, he seems to have been morose and peevish; but in point of moral denunciation, no dramatist surpasses him. With these three great poets, Greek tragedy may be said to close. With them it ceased to be the tragedy which Aristotle has described in his celebrated definition of it. "Tragedy," he says (*Poetics*, 6), "is the imitation of some action that is serious, entire, and of a proper magnitude; effecting, through pity and terror, the refinement of these and similar affections of the soul." In the hands of the subsequent authors this form of the D. grew lax and effeminate, and in the performances of Theodectes especially, tragedy was made to give way to rhetoric. (See the works of Böckh and Welcker on the Greek tragedians; also, Müller's *Literature of Ancient Greece*.)

The Romans were not a great dramatic people. They borrowed, according to the common account, during a period of national despondency occasioned by a desolating pestilence (A.U.C. 391), their first idea of a play from the Etrurians; their effusions of sportive humor, their *Fabulæ Atellanæ*, from the Oscans; and the higher class of dramatic compositions from the Greeks. Philology, likewise, countenances this story; for *histrio*, the Latin word for a player, is pure Etruscan. No remains of any note have come down to us of the comic writers of Rome, except Plautus and Terence. The former was a poor day-laborer, the latter a Carthaginian slave. The habits of each appear in their writings. Plautus has a degree of rough vigor and broad jocularity, born of the handmill and the plow, while Terence is more refined and delicate in his wit and characterizations. Both these writers borrowed largely from the Greeks. Of the early period of Roman tragedy no remains exist, but it is probable that its poets were merely translators or imitators of Greek models. The tragedians of the Augustan age were ambitious of rivaling the Greeks. Unfortunately, none of these grand attempts have come down to us, except ten bombastical and frigid dramas, that go under the name of Seneca.

Ancient art fell with pagan Rome. In the early ages of Christianity, any one connected with the theater was not allowed baptism. The unwise zeal of the fathers was followed by an edict of the emperor Julian to the same effect. The two Apollinarii, father and son, and Gregory of Nazianzen, attempted to introduce religious plays or mysteries, drawn from the Scriptures, to amuse the Christian people during the operation of Julian's law. In a short while, instead of the D. proper, there was nothing to lighten up the surrounding darkness but such productions as the saturnalian pageants, the Feast of Fools and the Feast of the Ass.

The Italians are the first people of Europe, who, after the long sleep of the true dramatic spirit in the middle ages, strove to enkindle the ancient fire upon Roman hearths that had for long years been cold. Early in the beginning of the 16th c., the first regular modern D. was published. It was called *Sophonisba*, and the writer was a very commonplace author, by name Trissino. Shortly after, this tragedian was followed by

Ariosto, by Babbiena, and by Macchiavelli, all distinguished cultivators of the classic comedy. Towards the end of the century, Giambattista de la Porta, philosopher and comic writer, exhibited a number of pieces of a familiar, and sometimes even farcical kind, but full of happy invention and agreeable originality. The political influence of Spain was now at its height on Italian territory, and the romantic D. of the west gradually found favor in Italy. Even so early as 1529, Ricchi had attempted to overthrow the classic taste in Italy, but without success. It remained for Borghini, Oddi, and M. A. Buonarroti, the nephew of the great artist, and one or two other writers, to break in upon the current taste, and to do much to introduce the romantic D. in Italy. In the 17th c., Rinuccini, by the union of music with the romantic D., succeeded in establishing the *melodrama*. Tragedy and comedy were now entirely laid aside as antiquated, and nothing but the *musica opera* was heard of from Milan to Ravenna. Maffei led the way in reforming the Italian stage. The political preponderance of Spain had now given way to that of France, which facilitated his labors not a little. His *Merope* is a fine attempt to restore the tragic D. to Italy, but as Lessing says of it, in his *Dramaturgie*, it is rather the production of a "learned antiquary" than of a great tragic poet. The musical D. had now to be rendered classic, and this task was undertaken by Zeno and Metastasio. The latter, who has all the attractiveness for the Italians that the classic Racine has for the French, by subtle harmony and grace in his songs, by his power of painting pathetic situations, and by his melting effeminacy of manner, charmed the hot southerners as no other poet yet had done. After Goldoni, a great comic authority in Italy, and a careful student of Macchiavelli and Molière, except Riccoboni and Gozzi his rivals, we have few dramatists of any note till we come down to last century. The bold and passionate Alfieri inaugurated a new era in Italian tragedy. He is a follower of the classic school, and a strict observer of the Aristotelic unities. His successors have relaxed more their adherence to classic forms, and have produced some very admirable dramas. Among the most estimable of those writers are Monti, Manzoni, and Niccolini.

In the other European nations as soon as dramatic composition rose to any degree of purity, it became thereby disconnected with the church. But in Spain this is by no means the case, for their best poets, while writing for the stage, have busied their pens in the composition of religious dramas. Passing over the names of Villena, Santillana, Naharro, and Rueda, as diligent but comparatively weak builders of the fame of the Spanish D., we come to the periods of Cervantes, of Lope de Vega, and of Calderon, when the Spanish stage may be regarded as in its best condition. In his *Numantia* particularly, Cervantes, whose genius was more decidedly epic than dramatic, has left to the world a specimen of tragic invention and of moral dignity which it is not likely to forget. While the critics were clamoring about the classic rules and the Aristotelic unities, Lope de Vega appeared on the scene, to set nearly all the dramatic laws at defiance. He is the most fertile dramatic writer in the world, besides being one of the best. Yet he prostituted his pen to serve the public, and sacrificed his future fame to his living popularity. Calderon, who succeeded him, possessed all his advantages, with the important additional merit of being thoroughly devoted to dramatic art as to a mistress. So great was Calderon reckoned in the composition of religious plays, that by letters-patent he enjoyed a monopoly of these productions for 37 years. The brilliant period of the Spanish theater, comprising the first half of the 17th c., had with the death of Calderon well-nigh closed. Except Moreto, Tirso de Molina, and Solis the historian, there is no writer of any note to engage the attention.

We come now to France, where the unities, as they are called, have been observed with as much strictness as if the country had been an old Grecian province. This is chiefly owing to the influence of the criticisms of Boileau, who adopted the dramatic unities in all their severe rigor. The critics of other nations, particularly of Germany and of England, have chosen to contemn this exposition of the D., and sometimes to despise even the Stagirite as a dramatic critic. The dramatic unities are threefold—action, time, and place. According to the French, these unities have the following significance: 1. That the action of the D. must be one—that is, that the interest or attention must not be distracted by several plots, but everything must be subservient to the main action. 2. That all the actions must take place on the same spot, or very nearly so, in order that the illusion may not be disturbed; and 3. Everything should happen on the same day for the same reason. Much has been written for and against these rules. Suffice it to say, that these are the landmarks on which the classic dramatist fixes his eye. Previous to Jodelle, or indeed to Corneille, hardly any progress had been made in the regular D. in France. A number of writers, of more or less ability, had produced *mystères, soties, moralités, farces*, in which, in numerous instances, the romantic or anti-classical tendencies of human nature had manifested themselves; but neither in the case of the brethren of the Passion, nor in the case of the *Enfans sans Soucis*, was there any progress made in the proper business of dramatic composition. Jodelle was the first writer who composed a regular five-act tragedy, and he publicly exhibited it in the presence of the court of Henry II. of France. He composed other pieces of equal, many of superior, merit, but nothing of any importance in the D. appeared before the time of Corneille. This writer, who appeared in the reign of Louis XIV., during the time that the star of Richelieu was in the ascendant, had to humor the court by humor-

ing the academy, and to please the academy he required to observe the rules of Aristotle. He produced seven plays, as cold and as severe as if they had been written by Sophocles, but of great elegance and dignity of style, when it struck him that he might give more free scope to his romantic tendencies in the tragedy of the *Cid*. All Paris rang with its praises, but the academy gloomed, and poor Corneille had to betake himself again to the dignity and severity of the Greek drama. He got what he longed for, however—a seat among the members of that institution which had been so instrumental in repressing the spontaneous outflow of his genius. It was more than his successor, Molière, obtained, who insisted to the last on playing his part as well as penning his pieces—an abuse which the dignified academicians could by no means tolerate. The genius of this dramatist was decidedly comic, and it may perhaps be questioned, whether, in all the essentials of true comedy, Molière's is not the very foremost name in the history of the stage. He borrowed much from the Spaniards, though perhaps less than Corneille; a great deal from the Latins; and more perhaps from the Italians. But the favorite tragic poet of the court of Louis XIV. was Racine. His genius lay decidedly towards the serious and the exalted, so that he had no temptations, like Corneille, to trespass the bounds of the academic proprieties. In tenderness and elegance, all French writers give way before him. In his *Athalie*, his last and best D., he gave to the Parisian public a composition, such as in breadth, in elegance, and in severe grandeur, it could nowhere find out of the Greek theater. But we must push through the crowd of lesser lights which shone on the decline of Racine and Molière, and glance at that bright and fitful luminary—Voltaire. He pressed boldly forward, and astonished all Europe with the force and power of his romantic dramas, a style of composition which, since the *Cid* of Corneille, had been altogether excluded from the theater. His spirit of intolerance was perhaps felt in his dramas, and his increasing warfare with superstition and fanaticism was too distinctly experienced even in the theater. But his genius and spirit have earned for him a place beside Corneille and Racine as one of the tragic names whom France delights to remember. Boursault, Regnard, Legrand, Lemercier, Victor Hugo, Dumas, and Alfred de Vigny, would all require to be noticed in a full view of the French drama.

The German D. is almost wholly dependent for its fame on the names of Lessing, Goethe, and Schiller. For while Rosenpluet, Hans Sachs, and Ayrer were original, and some of them fertile; while Gryphius, Gottsched, Gellert, and Schlegel show a decided advance in the appreciation of the laws of dramatic composition; yet from the feebleness of the writers, and from the backward state of theatrical taste in the end of the 17th and the beginning of the 18th centuries, very little was done towards a clear and distinct recognition of the excellence of dramatic literature, till the critic Lessing, in his *Miss Sara Sampson*, taught Germany to appreciate the productions of the romantic drama. As a critic, he blamed the French, praised Shakespeare, and professed belief in Aristotle. He held more than one dramatic heresy, and his antipathy to versification was among the number. Goethe is, without doubt, one of the greatest geniuses which the world has seen, but whether he is entitled to so high a place for his theatrical dramas remains an open question. As his aim was more emphatically the culture of his genius in its fullest form, the circumstance of his writings assuming the dramatic form is rather an accident than otherwise. From first to last he seems to have been distinctly aware of this, and in the prologue to his last, and by far his grandest production, he declares why he could not accommodate his genius to the demands of a mixed theater. Yet his *Faust* must ever be regarded as one of the grandest and most remarkable compositions which modern Europe has witnessed. Schiller was more expressly the dramatic poet of Germany than Goethe. While Goethe's genius was fuller and more complete, Schiller made up for what he wanted in breadth of vision by the moral intensity of his genius. From his wild play of the *Robbers*, down to his last D. of *Wilhelm Tell*, he worked with a vehemence such as has very seldom been witnessed. But he filled Germany, and indeed all Europe, with his tragic fame, and his name is one which "posterity will not willingly let die."

Dramatic exhibitions in England, if they did not originate in the church, were nevertheless speedily appropriated by the clergy. Ecclesiastics were frequently the composers of the religious pieces, or mysteries, and they were found not seldom to be the actors. The mass of the people, no doubt, owed a good deal of grotesque amusement, and even of occasional information, to the Biblical and legendary history, which those rude attempts at the D. were fitted to convey. Those old religious plays are generally divided into two classes—*miracles* or miracle-plays, and *moralities* or morals. The former were founded on Scriptural narratives, or on the legends of the saints; the latter arose from the former, by the increased introduction of imaginary features. These pious pastimes existed long before the reformation, and were not overthrown by that great revolution in the opinions and beliefs of the country. See MIRACLE-PLAYS and MORALITIES. It was about the middle of the 16th c. that the D. extricated itself completely from these ancient fetters. By this time both comedy and tragedy had begun to exist in a rude reality in England. The oldest known comedy (before 1557), that of *Ralph Roister Doister*, was written by Nicholas Udall, a school-master of considerable learning, probably about the middle of the 16th century. Ten years after appeared our first tragedy, known variously as *Gorbudoc*, or as *Ferrex and Porrex*, by Mrs. Norton and lord Buckhurst. And not only is this work the earliest tragedy in our language; it con-

tains, beside, the first application of blank verse to dramatic composition. But the play is dull, heavy, and declamatory. The D. lingered in this incipient condition until very near the time of Shakespeare. Bishop Still's *Gammer Gurton's Needle* is no improvement on *Roister Doister*. The names of Kyd, Lodge, Greene, Lyly, Peele, Marlowe, Nash, etc., must pass before us almost without comment. Many of these writers are not without their merits, particularly Marlowe, whose plays of *Edward II.* and of *Dr. Faustus* are acknowledged by Charles Lamb to contain passages that Shakespeare himself has not surpassed. Marlowe, besides, is the first author who introduced blank verse upon the *public* stage. But all these dramatists are obscured by their nearness to the great luminary of the English drama. Shakespeare is now almost universally acknowledged to be the greatest dramatic genius that has ever appeared in the world. He brought the romantic D. to a perfection which it is not likely to surpass. His writings present the finest example of the depth, sublimity, refinement, and variety of which the D. is capable; and they are abundantly marked by those peculiar characteristics which sprung from the union, in the person of its author, of such wonderful powers of conception with such familiar experience of theatrical management. Of course he despised the unities, or rather, we might say, he worked in ignorance of them, for he knew nothing of Aristotle and Boileau; and the rest of the French critics were not born when he died. Hence his D. is known in literature as "irregular;" and, we fear, human nature is likewise very irregular. The poet trusted to his own instinctive judgment, and of its exercise we have all fortunately plenty of examples. The principal of Shakespeare's contemporaries are Ben Jonson, and Beaumont and Fletcher. Like Shakespeare, Jonson wrote both tragedies and comedies. Milton speaks of "Jonson's learned sock," and thus hits off the main feature of his character as a dramatist in a phrase. Beaumont and Fletcher, who were, like many brotherly men in that age, joint-workers, have the honor of standing next to Shakespeare in the romantic D. of England. But, like Lope de Vega, they wrote too much for the mere success of the moment to be ranked in the foremost file of England's dramatic writers. With Massinger, Ford, and Shirley, the old English D. is closed. Dryden, the literary chief of his age, who flourished during the latter half of the 17th c., wrote some fine pieces of Frenchified declamation. Lee, and the unfortunate Otway, bring down the D. to the beginning of the 18th century. For, while Gay, Congreve, Cibber, Wycherley, Vanbrugh, and Farquhar, all display considerable dramatic spirit and invention, their works are, nevertheless, morally considered, the foulest things in the language. They paint well the externals of society, and have left behind them good specimens of the "comedy of manners," as it has been called; but vice is both warp and woof of nearly everything they have produced. Addison, Johnson, Young, Thomson, etc., wrote some good poetry, but poor dramatic verse; while Lillo, Moore, Garrick the actor, Goldsmith, the Colmans, and Cumberland, nearly all took to prose instead of verse. They produced agreeable comedies, but nothing of a very marked kind in the history of the D. appears until the time of Sheridan who gave an impulse to "genteel comedy," such as has placed him ever since at the head of the writers of that species of composition. Holcroft, Mrs. Inchbald, "Monk" Lewis, and Maturin, mostly influenced by inferior German writers, have left behind them a legacy of terror and of wonder fit to render their period marvelous, if for nothing else. Joanna Baillie and Sheridan Knowles remind the reader of the excellences of the old English D., and the *Lady of Lyons* of Bulwer Lytton is a favorite with playgoers of the present day. Byron, Coleridge, and Henry Taylor are the authors of fine meditative dramas, but they are more suitable for the closet than for the stage. Our sketch would not be complete without allusion to Talfourd, Jerrold, Shirley Brooks, Marston, Tom Taylor, Charles Reade, Robertson, Wills, H. J. Byron, and Gilbert. Swinburne, Tennyson, and Browning have also written works in the dramatic form.—See Ward's *History of English Dramatic Literature* (London, 1875).

DRAMA (*ante*). In the United States it is difficult to separate the English and American drama. The sameness of language, the similarity of dramatic themes, and the free and constant intermingling professionally of American and English artists, make a homogeneous whole rather than separate branches. The literature of the drama in the United States is very extensive; but, as in England, a great proportion of it is of little value. It was some time after the establishment of independence before the dramatic muse began to work; and the earliest productions were naturally based upon our warlike achievements, the glories of our battle-fields, the invincible courage of our heroes, and the ignominious defeats of the enemy. It scarcely needs be said that such dramas, following like shadows upon events so recently passed, were veritable trash, not only in a literary but in an acting view. Centuries must roll by ere Lexington, and Saratoga, and Yorktown can become fit subjects for dramatic treatment. Shakespeare's historical plays took little hold of the English public until Garrick entered into the body and soul of Richard III., three hundred years after Bosworth field and a century after the death of the swan of Avon. The first theater to open after the departure of the British troops was that in John street, New York, 1785. All the players of note were English, and so were the plays. The first play by an American author presented on the stage was *Contrast*, written by Royal Tyler, afterwards chief-justice of Vermont. It was a poor affair, but served to introduce to the boards that abomination known as the

exaggerated "Yankee," which could not be banished for three quarters of a century. William Dunlap was the first prolific American dramatist, some of whose work was fair for the period, while much more of it was poor. He produced about fifty plays, some of which were translated from the German. The building of the Park theater, New York (opened Jan. 29, 1798), gave the drama a fresh start, although all the chief players were from the old country, and the opening play was *As You Like It.* On Jan. 24, 1809, "the American Roscius" made his début on the Park stage as "Young Norval," following with more solid characters. This lad was John Howard Payne. He wrote and translated a number of plays, of which his own tragedy *Brutus, or the Fall of Tarquin*, still keeps the stage. It is a powerful, well-constructed tragedy, and bears comparison with those of any English writer excepting only Shakespeare; moreover, it is the first drama of importance written by an American author. It was not until about 1820, that literary and cultured people began to look with favor upon the drama. The Park theater was burned in May of that year, but was rebuilt and opened in Sept., 1821, when Charles Sprague, then among the foremost of native poets, wrote the inaugural address, and Samuel Woodworth, another poet of high standing and also a dramatist, wrote the prize poem. Soon after this period, play-houses began to multiply, and the solid phalanx of English artists was now and then broken by the invasion of American players, none of them, however, destined to achieve greatness. There were some who rose to local celebrity; such as Rosalie Pelby, Anne Jane Henry, Caroline Placide, Alexina Fisher, then a mere child, and Julia Wheatley, a singer. Further impetus was given to the American drama by the presence of the great tragedian Edmund Kean, who played two short engagements in New York and Philadelphia. Opera also began to appear in force under Signor Garcia and his daughter Felicité, afterwards the renowned Malibran. In 1826, James K. Hackett made his first appearance as "Sylvester Daggerwood." He became famous in "Falstaff" and "Monsieur Tonson," in Yankee parts, and especially in "Sir Harcourt Courtly." Kean was hardly gone when Edwin Forrest made his first effort in a Shakespearean part as "Othello," June 24, 1826. Forrest is held in memory by a large majority of his countrymen as the greatest of American tragedians. The two Wheatley families (one English and one American) were coming into prominence about this period. Forrest, always intensely American in feeling, undertook to infuse the native idea into his work. He appeared in John A. Stone's *Metamora* (written for Forrest), and especially engaged Dr. Bird of Philadelphia to write a new play. The result was *The Gladiator*, a Roman episode removed as far as possible from this new world. Bird also wrote *Oraloosa*, another Indian piece. Stone was a native of Massachusetts, and the author of *Fauntleroy; Tancred of Sicily; Laroque, the Regicide;* and other dramas. He committed suicide when but 33 years of age. In 1830–31, two noted delineators of Yankee parts appeared in Danford Marble and George H. Hill, and were popular in a low grade of plays for many years. The season of 1832–33 brought over Charles and Fanny Kemble, who enjoyed immense popularity. The year before, the celebrated Ravel family had taken the people by storm, but they had no connection with the drama. In the spring of 1833, again appeared the great and erratic Booth, father of Edwin. He had appeared first in the United States, Oct., 1821. "Master Burke," or Charles S. T. Burke, one of the best of American comedians, appeared in 1836. In the same year, Misses E. and J. Anderson, granddaughters of the first Joseph Jefferson, made a successful beginning. The first became successively Mrs. Thoman and Mrs. Saunders, and the other Mrs. Germon, mother of Effie, artists by birth. Nathaniel H. Bannister, a native of Delaware, started in 1813, and acquired considerable reputation, both as actor and dramatic author. Then came a mere boy, at the obscure National theater, one destined to be the foremost of American comedians—Joseph Jefferson, son of Joseph, grandson of the first Joseph, and half-brother of Charles Burke. These great artists illustrate the truth of hereditary transmission. About this time, James E. Murdoch, a Philadelphian, began to make his mark in tragedy. In 1836, appeared Miss Jean Margaret Davenport, an infant phenomenon. She became the wife of col. Frederick W. Lander, and during the war of the rebellion she was a devoted nurse in the hospitals of the union army. Charlotte Cushman, the greatest of American actresses, now threw the light of her powerful genius and individuality upon the stage. In 1838, Mary Cecilia Taylor ("our Mary") made her début, and became perhaps the most popular favorite ever known in New York city—a very clever and versatile though not a great actress. "The Shaws," as three talented sisters were called, were now coming prominently forward. They were Regina (first, Mrs. Charles Howard, and then Mrs. H. Watkins), Mary (first, Mrs. Fogg, and then Mrs. Krollman), and Josephine (first, Mrs. Russel, and then Mrs. John Hoey). All had more than ordinary talents, and were great favorites. Edward Eddy, b. in Troy, N. Y., appeared in 1839; a very heavy tragedian and melodramatic actor. In the same period came Joseph Proctor and his wife (Miss Hester Warren). John Gilbert first appeared in New York in 1839, and has ripened into the most accomplished "old man" on any stage. He was born in Boston in 1810, and made his début there in 1828.

Thus we struggled on with English plays and English players, except as above mentioned, until John Brougham, an Irishman, came over (in 1842) to stay. He was the first author to put life into the play-bills. Though not born here, his work was essentially American, especially those inimitable burlesques, *Pocahontas* and *Columbus*. He was also the best Irish and general comedian of the day. In June, 1844, a bright par-

ticular star appeared in the person of Anna Cora Mowatt, who was for several years the reigning favorite in genteel comedy and light tragedy. Only a few months before, Edward L. Davenport had made his mark, and he supported the rising actress in a successful tour. Davenport was an actor of great versatility, taking almost anything from "Hamlet" to "Bill Sykes." He was a native of Boston. Another welcome addition to the stage was Julia Dean, a native of New York, whose line was much like that of Mrs. Mowatt. John Lester Wallack (born here of English parents) made his first appearance in 1847. He is a worthy successor of his father, James W. Wallack, and a fit representative of a family that have shed luster upon the stage. In Dec., 1849, the "Bateman children" (Kate, aged 6, and Ellen, aged 4) appeared as dramatic prodigies. Ellen did not long remain on the stage, but Kate Josephine (Mrs. Crowe) became one of the foremost of American actresses, and had great success in England. In 1850, George L. Fox, low comedian, and afterwards pantomimist, began a successful career.

Besides the American artists already mentioned, we must name (with some repetitions) Joseph Jefferson (3d) the first in comedy and pathos, William Warren, Edwin Booth (first in tragedy, and who seems to have touched perfection in the illustration of his select Shakespearean characters), A. A. Addams, Lawrence Barrett, Mrs. D. P. Bowers, John McCullough, Frank S. Chanfrau, John S. Clarke, Edwin Adams, J. M. Field, Mary Gannon, Mrs. Barrett, Matilda Heron, George Jamison, Frank Mayo, John E. Owens, John T. Raymond, John R. Scott, Daniel E. Setchell, Mark Smith, Charlotte Thompson, William J. Florence, Maggie Mitchell; and many others might be added. America is much stronger in players than in plays. Even Payne's tragedy of *Brutus* is made up of foreign materials. Some of the play-writers who have been most prominent are William Dunlap, David Paul Brown, Robert M. Bird, Nathaniel H. Bannister, Robert T. Conrad, George H. Boker, Epes Sargent, Dr. J. S. Jones, and Dr. W. K. Northall. Mrs. Mowatt, the actress, wrote *Fashion* and *Armand*. J. Wilkins wrote *Civilization*, and has not since been heard from in authorship. Julia Ward Howe has written for the stage. Harriet Beecher Stowe is hardly a dramatist, but her powerfully dramatic story of *Uncle Tom's Cabin*, which needed little except cutting down to fit it for the stage, has had far greater popularity than any other drama ever produced in America. Nathaniel P. Willis wrote tragedies; George H. Boker has done the same. Among American writers in 1880 are Bartley Campbell and Bronson Howard. Dion Boucicault, though not an American citizen, has produced in this country plays which have had popularity. There is a vast accumulation of trash in the green-room, crudely patched up by players themselves, and by third-rate writers who make plays to order as a cordwainer makes shoes. There is much cheap translation and adaptation of French plays, which often remain quite unadapted to a true American taste. So long as English and French authors fill the popular demand, the American stage will depend largely upon foreign supply. Still, America is growing in intellectual independence; and, considering the fact that the people are in one sense English, and the nation too new to furnish home material for historical dramas, its progress thus far is at least moderately good. There is a peculiar class of dramas that are as redolent of the American soil as *Jack Sheppard* and *Oliver Twist* are of that of old England. Such are the sensational pictures of Indian and border life, full of powder and blood and bowie-knives and exciting situations, but utterly worthless in a literary or artistic view. As concerns artists, we have sent to the mother country men and women who fairly balance our obligation for the Keans and the lesser lights from time to time sent to us across the ocean.

DRAMATIC WORKS, COPYRIGHT IN. Dramatic and musical works enjoy a legislative protection peculiar to themselves. By 3 and 4 Will. IV. c. 15, it is provided that the author of any dramatic piece not printed or published by him or his assignee, shall have, as his property, the sole liberty of representing it, or causing it to be represented, at any place of dramatic entertainment; and the author of any published dramatic work shall have the same privilege during his life, or his assignee for 28 years from the date of publication. By 5 and 6 Vict. c. 45, s. 20, the provisions of the former statute are extended to musical compositions; and the term of copyright provided for other works (see COPYRIGHT) is applied to the liberty of representing dramatic pieces and musical compositions. The following section (21) reserves to the proprietors of dramatic works the remedies given them by 3 and 4 Will. IV. c. 15, s. 2. These are the power of exacting from every offender a sum not less than 40 shillings, or the full amount of the benefit or advantage arising from the representation, or a sum equivalent to the loss sustained by the plaintiff, "whichever shall be the greater damages." The action must be brought within a year. The provisions of the act extend to both sexes.

DRAMBURG, a t. in the province of Pomerania, Prussia; 53 m. e. of Stettin; pop. about 5,626. There are in the place a number of manufactories, a normal school, and a gymnasium.

DRAM'MEN, a seaport t. of Norway, in the province of Aggerhuus, on both sides of the river Drammen, which here discharges its waters through the Drammen fiord into the gulf of Christiania, about 24 m. s.w. of Christiania. D., which is built in a valley, is divided into three quarters—Bragenœs on the n. bank of the river, and Stromsoe and Tangen, on the s. united to the first-mentioned quarter by a handsome bridge. The

chief streets, which run along each side of the river, are mainly composed of warehouses. The manufactures of D. are leather, ropes, sailcloth, tobacco, spirits, and earthenware; but the chief industry is the export of timber. Pop. 1875, 18,838.

DRANESVILLE, a village in Halifax co., Va., about 20 m. n.w. of Washington. A battle was fought here, Dec. 20, 1861, between the unionists and the confederates. It was an artillery duel, important only as the first success gained by the union army of the Potomac.

DRAPER, JOHN WILLIAM, American chemist and physiologist, was b. near Liverpool, England, May 5, 1811, and educated at a Wesleyan school at Woodhouse Grove, and later pursued his studies in chemistry under Dr. Turner of the London university. In 1833, he joined some of his relations who had emigrated to America, and in 1836, took his degree of doctor of medicine in the university of Pennsylvania, and was appointed professor of natural philosophy, chemistry, and physiology in Hampden Sidney college, Virginia. In 1839, removing to the city of New York, he was connected with the preparatory department, and in 1841, joined Drs. Mott, Patterson, etc., in founding the medical college of New York university, in which he was at first professor of chemistry, and in 1850, of physiology. He is a clear and able lecturer, and a voluminous writer, having been a liberal contributor to the American *Journal of Medical Science* and the Edinburgh *Philosophical Journal*, and published a treatise on *The Forces which produce Organization in Plants* (4to, 1844); *Text-book of Chemistry* (12mo, 1846); *Text-book of Natural Philosophy* (8vo, 1847); *Human Physiology, Statical and Dynamical, or the Conditions and Course of Life in Man.* Dr. D. has also published *History of the Intellectual Development of Europe; Thoughts on the Future Policy of America* (1865); *Philosophical History of the Civil War in America* (1867–70); *History of the Conflict between Religion and Science* (1874).

DRA'PERY (Fr. *drap*, cloth), any kind of woolen cloths for dress, the dealers in which in England are known as drapers. In London, the drapers' company is one of the more wealthy civic corporations, with a hall and almshouses.

DRAPERY in art. From the very great difficulties with which the artist has to struggle in dealing with the arbitrary and ungraceful forms of modern dress (see COSTUME), we are often led to regard drapery as an impediment, in place of an aid and accessory, to the representation of the human form in plastic art. The erroneous nature of such a conception will be manifest at once to those who direct their attention to the study of drapery in antique art, with a view to discovering not so much how as why it was employed by a people whose national customs admitted of their almost wholly dispensing with it had they felt so disposed. Such a study will convice us that, when properly disposed, drapery tends, in many cases, to exhibit the form, to enhance the characteristics, and to intensify the attitude, whether in action or in repose. It tells, moreover, something of the circumstances in which the action takes place beyond what could possibly be told by the naked figure. The waving drapery of a hunting Diana, or an Apollo shooting with the bow, tells us at once that the action is taking place in the open air, with the fresh breezes of the Ægean blowing around them. On the other hand, that repose which is the peculiar characteristic of sovereignty, is indicated by the still and heavy character of the drapery which surrounds a Jupiter on Olympus, or a Cæsar on his throne. The simple rule—simple in principle, though by no means always easy in practice—for the disposal of drapery, seems to be that it shall never be employed without an object; and that every fold shall, so to speak, be a logical result, either of the form of the figure, of the circumstances in which it is placed, or of some previous fold to which the latter is subordinated.

DRAPIER LETTERS, written by Dean Swift over the signature "M. B. Drapier," in which he counseled the people of Ireland not to receive the money coined by William Wood, to whom the English government had granted a patent in 1722 to supply a deficiency in the coinage of that country, of more than $500,000. The letters made a great sensation in Ireland, and caused the patent to be canceled, but not until about $400,000 in half-pence had been coined. Popular feeling was so intense at the time, that Wood was forced to leave the country.

DRAUGHT or DRAFT OF WATER, in maritime affairs, is a technical name for the depth to which a ship sinks in the water when fairly afloat, The D. is marked on the stem or stern-post, or both, from the keel upwards. When a ship is in good trim, the D. does not differ much at the two ends. Ships with sharp bottoms draw more water, or have a "greater draught," than those of flatter construction. For D. as applied to plows, wagons, etc., see TRACTION.

DRAUGHTS, like chess, is a game played with "men" on a checkered board. As far as the *science* of the game is concerned, it falls far short of chess, but is nevertheless a favorite recreation with many classes of people. In France it is called *les dames*, from its having been a favorite game with ladies; and in Scotland the-draught-board is called the *dambrod*.

Two persons usually play this game, each having a set of twelve men—one set black, the other white. The men may be placed either on the black or white squares, but the

whole must be placed on one color only. Thus, in England, it is usual to play upon the white squares, with a black square to the lower right, and in Scotland upon the black, with a white square to the lower right. In chess, the men may be moved straight forward, sidewise, or diagonally, and over many squares at once; but in D., the men may be moved diagonally only, and by *one* square at a time. If an enemy's man stands in the way, no move may take place unless there be a vacant square beyond into which the piece can be lifted. The man leaped over is then taken and removed from the board. The grand object of the game is, therefore, to clear the board of the enemy's men, or to hem them in so that they cannot be moved, and whichever party does so first, wins the game. As no piece can move more than one step diagonally at a time, there can be no taking till the antagonists come to close quarters; and the advancing of them cautiously into each other's neighborhood is the chief art of the game. When a man on either side has made his way, either by taking or by a clear open path, to the opposite side of the board, he is entitled to be "crowned," which is done by placing another man on the top of him. Crowned men may move either backwards or forwards, but always diagonally and by one square at a time, as before; and this additional power thus gained gives a great advantage to the player who owns the greatest number of crowned heads, and usually decides the game in his favor.

DRAUGHTSMAN. A draughtsman differs from a designer inasmuch as he lays no claim, in that capacity at all events, to the character of an originator.

DRAVE (Ger. *Drau*), a river of Austria, rises in the e. of Tyrol, in lat. 46° 45′ n., and long. 12° 25′ e., flows n.e. through the Pusterthal towards Lienz, where it is joined by the Isel. It then flows e. through Carinthia, passes Villach, where it becomes navigable, after which it passes Marburg, receives the Dran from the right, and the Mur, its principal affluent, from the left; then turning towards the s.e., it forms the boundary between Croatia and Slavonia on the right, and Hungary on the left, and pours its waters into those of the Danube at a point 10 m. e. of Essek, the capital of Slavonia. The D. is nearly 450 m. long. In the first part of its course, it is a mountain torrent, rushing furiously through the mountain passes of Tyrol; but joined by numerous streams, its volume increases, and its course becomes more staid. The valleys through which it flows in its course through Carinthia, Styria, and Croatia, are distinguished by great fertility and picturesque scenery, while the population upon its banks is numerous and industrious. In Slavonia, the D. is frequently bordered by dense forests.

DRAWBACK, a term in commerce, employed in connection with the remitting or paying back of excise duties on certain classes of articles exported. Excise duties, as a matter of course, enhance by so much the natural price of the commodity on which they are imposed. Were these duties not remitted, the commodity so taxed would not be ordered from those foreign countries where articles of the same kind could be purchased free of such duties. To afford facility for the exportation of these articles, the state resorts to the expedient of returning to the exporter a sum equal in amount to what he or the manufacturer had paid to the excise. Such is drawback. Among other matters of fiscal policy, Adam Smith, in his *Wealth of Nations*, discusses the propriety of giving drawbacks, and sees in them nothing that is adverse to a sound political economy. "To allow," he says, "the merchant to draw back upon exportation, either the whole or a part of whatever excise or inland duty is imposed upon domestic industry, can never occasion the exportation of a greater quantity of goods than what would have been exported had no duty been imposed. Such encouragements do not tend to turn towards any particular employment a greater share of the capital of the country than what would go to that employment of its own accord, but only to hinder the duty from driving away any part of that share to other employments. They tend not to overturn that balance which naturally establishes itself among all the various employments of the society, but to hinder it being overturned by the duty: they tend not to destroy, but to preserve, what it is in most cases advantageous to preserve, the natural division and distribution of labor in the society." Correct as is this view in general principle, it could perhaps be shown, by the closer experience of the present day, that the practice of giving drawbacks is liable to abuse; as, for example, when an excisable article falls in value, and it is exported in order to get the D., with little or no reference to sales abroad, or in the hope that the D. will at least bring the amount of the freight. So far, therefore, the state is made to foster an improper species of commerce. To prevent deceptions as far as is practicable, certain rules and formalities have to be attended to by exporters, to which we shall briefly refer.

In preparing goods for D., they must be packed in presence of an excise-officer, who sees them weighed, if the D. depends on weight. When the package is completed, he incloses it with a tape, which is properly fixed with a seal. Under this seal it is transferred to the port of shipment, and cleared for export by a person authorized by license from the officers of customs. In the case of press-packed goods, the quantities and qualities must be verified by the oath of the master-packer or his foreman. D. is given only on goods which have been charged with duties within three years, and no D. is given on damaged or decayed goods. It is payable only to the real owners of the articles shipped. It is not payable for a certain period after shipment and departure; but cannot be demanded later than two years after shipment. As a

verification of the principal particulars mentioned, the excise-officer concerned executes a certificate or debenture (q.v.), and under its operation the D. is paid by the inland revenue department.

DRAWBRIDGE. See BRIDGE.

DRAWER OF A BILL. See DRAFT, BILL.

DRAWING is the art of delineating form, as opposed to color and light and shade. The term is not confined to the first outline produced by the pencil or crayon, though this is a narrower sense in which it is also used, and what we commonly mean when we speak of a drawing. In its wider sense, D. is used to describe what is in reality the most important feature of a finished painting of Raphael or Correggio, as well as of an outline by Flaxman or Retch. D., in this sense, has been termed the grammar of art. But the analogy is incomplete; for the one quality which is requisite in the application of grammar, is correctness, whereas D., even when correct, even when faultless, admits of degrees of perfection. It may be more or less powerful, more or less free, more or less graceful; and indeed there is no characteristic in which the great artists of the Italian and Flemish schools more unmistakably excell all their successors, than in the power and beauty of their drawing. Neither is there any feature which more unmistakably stamps the individuality of the artist upon the picture.

DRAWING-BOARD, a board on which drawing-paper is strained for painting on in water-colors. The paper is wetted for the purpose of being strained, and, when attached at the edges, it is permittted to dry and contract. Formerly, the drawing-board was fitted into a frame, the edges of the wet paper being made fast by the pressure of the frame on the board. But the much simpler drawing-board which is now in use is made of a flat piece or pieces of wood, held together, and prevented from warping, by an edging of other pieces, the grain of which runs in the opposite direction. The wet paper is attached to the edges of the board with paste or thin glue, and when dry, becomes perfectly firm and flat. When the work is finished, the paper is cut beyond the drawing with a knife.

DRAWING AND QUARTERING. The punishment for treason still is, that the offender be *drawn* to the place of execution on a hurdle (q.v.); that he be hanged by the neck till he be dead; that his head be severed from his body, and that body be divided into four parts, or *quartered.* The sovereign may, and now certainly would, by a warrant under the sign-manual, countersigned by a principal secretary of state, change the sentence into beheading. In the case of females, the quartering is dispensed with. Stephen's *Commentaries,* iv. 234. See TREASON.

DRAW-PLATE, a steel plate with a graduated series of holes, through which metals are drawn in making them into wires or bars.—Also a name given to a plate of metal placed before a fire or before the lateral opening between the top of the fireplace and the throat of the chimney. Its use is to force the air to pass through the fire on its way into the chimney, instead of allowing it to pass over the fire.

DRAYTON, MICHAEL, was b. in 1563 at Hartshill, in Warwickshire. Of the events of his life but little is known. He is supposed to have studied at the university of Cambridge, and to have been in the army when young. His earliest work, *The Shepherd's Garland,* was published in 1593. He afterwards published the *Barons' Wars; England's Heroical Epistles,* etc. The *Polyolbion,* the work by which he is best known, appeared in 1613. He was poet-laureate in 1626; he died in 1631, and was buried in Westminster abbey. As a poet, D. is but little known, save to readers like Charles Lamb, who delighted in the obscure corners of literature. His *Polyolbion* is a topographical poem; and passages from it, now and then met with in county histories and works of an antiquarian character, surprise the readers with their stately rhythm, their nervous force, and their felicity of diction. Vols. I., II., and III. of a complete edition of D.'s works, by the Rev. Richard Hooper, M.A., were published in 1876.

DRAYTON, WILLIAM HENRY, 1742–79; b. S. C.; educated at Oxford, England. In 1771, he was privy councilor of South Carolina; but when the revolution began, he espoused the popular cause, and became a member of the committee of safety. In 1775, he was president of the provincial congress, and the next year was elected chief-justice of South Carolina. He was a prominent member of the continental congress until his death. He left a minute narrative of the current events of the revolution.

DRAYTON-IN-HALES, or MARKET DRAYTON, a t. in the n.e. of Shropshire, on the Tern, 19 m. n.e. by n. of Shrewsbury. Pop. '71, 4,039, chiefly agricultural. There are manufactures of paper, and of hair-seats for chairs. The parish church was built in Stephen's reign, but quite altered by repairs in 1787. Here, in 1459, the Yorkists defeated the Lancastrians.

DREAMING. In complete sleep, there is probably an entire absence of consciousness of external things. Usually, however, there is a certain amount of mental activity, of which we are more or less conscious at the time, and of which we have more or less subsequent remembrance. This is the state known as dreaming. The chief feature of

this state is "an entire *absence of voluntary control* over the current of thought, so that the principle of *suggestion*—one thought calling up another, according to the laws of association—has unlimited operation." We seem to perform all the actions of life; we experience every kind of mental emotion, and sometimes our reasoning processes are remarkably clear and complete. Thus, when the mind, during sleep, takes up a train of thought on which it had been previously engaged during the preceding waking hours, intellectual efforts may be made during sleep which would be impossible in the waking state. Such cases, however, are not common. To name two instances (quoted by Dr. Carpenter in his essay on sleep in the *Cyclopædia of Anatomy and Physiology*): Condorcet saw, in his dreams, the final steps of a difficult calculation which had puzzled him during the day; and Condillac states that, when engaged with his *Cours d'Etude*, he frequently developed and finished a subject in his dreams which he had broken off before retiring to rest.

Occasionally, but by no means commonly, dreams seem to possess a remarkable coherence and congruity in reference to the reasoning processes, or the combinations of the imagination. Most of our readers are probably acquainted with the incident narrated by Coleridge of himself, that his fragment entitled *Kubla Khan* was composed during sleep, which had come upon him in his chair whilst reading the following words in Purchas' *Pilgrims:* "Here the khan Kubla commanded a palace to be built, and a stately garden thereunto; and thus ten miles of fertile ground were inclosed within a wall." Coleridge continued for about three hours apparently in a profound sleep, during which he had the most vivid impression that he had composed between 200 and 300 lines. The images, he says, "rose up before him as things, with a parallel production of the correspondent expressions, without any sensations or consciousness of effort." On awakening, he had so distinct a remembrance of the whole, that he seized his pen and wrote down the lines that are still preserved. Unfortunately, he was called away to attend to some business that lasted more than an hour, and on his return to his study, he found, to his intense mortification, that "though he still retained some vague and dim recollection of the general purport of the vision, yet, with the exception of some eight or ten scattered lines and images, all the rest had passed away like the images on the surface of a stream into which a stone had been cast." In other cases, a dream may leave a strong general impression on the mind, although particulars, even immediately on waking, cannot be recalled. Tartini is said to have composed the *Devil's Sonata* under the inspiration of a dream, in which the arch-fiend challenged him to a trial of skill. The dreamer lay entranced by the transcendent performance of his distinguished visitor; but on awakening and seizing his violin, although he was unable to reproduce the actual succession of notes, he produced from his general impressions the celebrated composition which we have named.

Generally, however, dreams are wanting in coherence; all probabilities, and even possibilities of "time, place, and circumstance" are violated. Friends long since dead appear and converse with us; and events long since past rise up before us with all the vividness of real existence. We may be conveyed to the antipodes, or even to worlds beyond our own, without the difficulty of the distance at all standing in the way. We are not aware of the grossest incongruities, probably because we are unable to test the probability of the phenomena by our ordinary experience; hence nothing that we see or do in a dream surprises us. Prof. Wheatstone observes, that "we may walk along the brink of a precipice, or see ourselves doomed to immediate destruction by the weapon of a foe, or the fury of a tempestuous sea, and yet not feel the slightest emotion of fear; though during the perfect activity of the brain we may be naturally disposed to the strong manifestation of this feeling. Again, we may see the most extraordinary object or event without surprise, perform the most ruthless crime without compunction, and see what in our waking-hours would cause us unmitigated grief, without the smallest feeling of sorrow;" and Cicero, who long previously had made D. his study, justly remarks (*De Divinatione*, 59), that if it had been so ordered by nature that we should actually do in sleep all that we dream, every man would have to be bound down on going to bed. Occasionally, however in place of this passive condition, the emotions may be highly excited; thus, for example, the sailor's wife is apt, especially in stormy weather, to dream of shipwreck, and to shriek with terror from its attendant miseries; and those who have once in their lives been exposed to some fearful danger, are apt to have the scene recalled to them in their dreams, either with all its appalling and life-like exactness, or possibly in a grotesque and impossible modification.

Although the predisposing causes of dreams may be sought for in more than one direction, they are probably in general referable to some peculiar condition of the body, and are often called into action through the agency of the external senses. Dr. Gregory relates, that having occasion to apply a bottle of hot water to his feet at bed-time, he dreamed that he was walking up Mt. Etna, and found the ground insufferably hot. Dr. Reid having had a blister applied to his head, dreamed that he was scalped by a party of Indians. M. Gizon de Buzereinges made a series of pre-arranged experiments, with the view of seeing how far he could determine at pleasure the character of his dreams. In his first experiment, having allowed the back of his head to be uncovered during sleep, he thought that he was at a religious ceremony in the open air; the custom of the country in which he lived being to keep the head covered, except on some rare occur-

rences, among which was the performance of religious ceremonies. On waking, he felt cold at the back of the neck, as he frequently had felt when present at the real ceremonies. He repeated the exepriment in two days with the same result. In a third experiment, he left his knees uncovered, and dreamed that he was traveling at night in the diligence; and all travelers know, he observes, that it is chiefly at the knees that they feel cold when traveling by that conveyance at night.

One of the most remarkable phenomena of D., is the rapidity with which long trains of thought pass through the mind. A dream requiring hours for its accomplishment, is begun and terminated in a few seconds. A person who was suddenly aroused from sleep by a few drops of water sprinkled in his face, dreamed of the events of an entire life in which happiness and sorrow were mingled, and which finally terminated with an altercation upon the borders of an extensive lake, in which his exasperated companion, after a considerable struggle, succeeded in plunging him. Dr. Abercrombie relates a similar case of a gentleman, who dreamed that he had enlisted as a soldier, joined his regiment, deserted, was apprehended, carried back, tried, condemned to be shot, and at last led out for execution. After all the usual preparations, a gun was fired; he awoke with the report, and found that a noise in an adjoining room had both produced the dream and aroused him from sleep. Dr. Carpenter mentions the case of a clergyman falling asleep in his pulpit during the singing of the psalm before the sermon, and awakening with the conviction that he must have slept for at least an hour, and that the congregation must have been waiting for him; but on referring to his psalm-book, he was consoled by finding that his slumber had lasted not longer than during the singing of a single line. Sir Benjamin Brodie, in his *Psychological Inquiries* (1854), mentions the following anecdote of the late lord Holland: "On an occasion when he was much fatigued, while listening to a friend who was reading aloud, he fell asleep and had a dream, the particulars of which it would have occupied him a quarter of an hour or longer to express in writing. After he woke, he found that he remembered the beginning of one sentence, while he actually heard the latter part of the sentence immediately following it, so that probably the whole time during which he had slept, did not occupy more than a few seconds." Many facts of the same kind are on record, and as the author from whom we have quoted, remarks, "if were to pursue this subject, it would lead us to some curious speculations as to our estimate of time, and the difference between the real and the apparent duration of life." It is from cases of this nature that lord Brougham has been led to the opinion, that *all* our dreams really take place in the act of falling asleep or of awaking. We cannot, however, explicitly accept this doctrine. 1. There is no sufficient proof of its being true. 2. We have a proof to the contrary in the fact, that it is common for people to moan and even talk in the middle of a sleep; and every one who has kept a dog must frequently have observed him dreaming (from the outward manifestations which he makes in the form of snarling or growling), though he still remains asleep. Some, on the other hand, have argued that the mind can never be entirely inactive, and that every one is dreaming throughout the whole period of sleep, although the dreams may not be remembered in the waking state. We know of no facts that can be adduced in favor of this hypothesis, and the following case goes strongly to disprove it: A woman, aged 26, who had lost a portion of the scalp, skull, and dura mater, so that a portion of her brain was exposed to view, was a patient in 1821 in the hospital at Montpellier. When she was in a dreamless state, or in profound sleep, her brain was comparatively motionless, and lay completely within its bony case; but when the sleep was imperfect, and the mind was agitated by dreams, her brain moved and protruded from the skull, forming what is termed cerebral hernia. This protrusion was greatest when the dreams, as she reported, were most vivid; and when she was perfectly awake, especially if actively engaged in conversation, it attained its highest development, nor did this protrusion occur in jerks, alternating with recessions, as if caused by arterial action, but remained permanent while the conversation continued. If the *data* of this case are to be depended on, the appearance of the brain during profound sleep seems to indicate that during that state there is a total or nearly total suspension of the mental faculties.

The author of *Psychological Inquiries* suggests the question: Do dreams answer any purpose in the economy of living beings? We regret that he has not given us a very definite answer, but he obviously inclines to the view that they cannot be purposeless. No one has hitherto offered any certain explanation of the uses of the spleen, of the thyroid gland, or of the supra-renal capsules; yet no one believes the formation of these organs to be merely incidental, or doubts that they have some special (although at present unknown) function to perform. "Dreams are," he observes, "at any rate, an exercise of the imagination. We may well conceive that one effect of them may be to increase the activity of that faculty during our waking-hours, and it would be presumptuous to deny that they may not answer some purpose beyond this in the economy of percipient and thinking beings."

Dreams have, in all ages and countries, been believed in as indications of the future; and of all forms of superstition, this is perhaps the most excusable. Whatever is mysterious as to its cause, and beyond the power of the will, appears as supernatural; and what more so than dreams! The thoughts in dreams, too, arise out of the past and present circumstances of the dreamer, and therefore are not altogether without connec-

tion with his future destiny, as most other omens are. In the Homeric age, it was firmly held that "dreams come from Zeus." In the most ancient civilized communities of which we have any record—those of Egypt and Babylon—to interpret the monarch's dreams was one of the most important state offices, and was confided to a college of wise men. A common way of consulting the Greek and Roman oracles (q.v.), was for the inquirer to sleep a night in the temple, after performing sacrificial and other rites, when his questions were supposed to be answered in dreams. Grave philosophers wrote treatises on the interpretation of dreams, as they did on astrology. Even Bacon, although he confesses that the interpretation of dreams is mixed with numerous extravagances, yet speaks as if he thought that something might be made of it. In modern times, and among European nations, dreams are seldom heeded except by the very ignorant or superstitious; and "as idle as a dream" has become a proverb. Nothing can be conceived more arbitrary than the pretended rules of interpretation—e.g., "that to dream of gold is good luck, but of silver, ill." See Brand's *Popular Antiquities*, by Ellis, where a "Dictionary of Dreams" is given. As to the actual coincidences that sometimes happen between dreams and events, it is only surprising, considering the countless fancies that are passing through our minds while asleep, that the coincidences are not ten times more numerous than they are.

DREBBEL, CORNELIS VAN, 1572–1634; a Dutch inventor of whose life little is known. He seems to have been a favorite at court, and tutor to the son of Ferdinand II. In the thirty years' war he was arrested and saved from execution only through interference of James I. of England. After 1620, he resided in London, where, it is said, he invented the compound microscope and an air thermometer with its bulb filled with water. It was reported also that he showed the king a glass globe in which, by means of the four elements, he had produced perpetual motion; and that by means of other machinery he imitated lightning, thunder, rain, and cold, and was able to speedily exhaust a river or lake. He made some discoveries in dyes, which were used by the founders of the Gobelin manufactures.

DREDGE, a machine for dragging or dredging the bottom of seas, rivers, or lakes, in order to bring up oysters and other animals that lie on the bottom. The common oyster-dredge is a bag-net, made of iron rings, linked together to form the meshes; the mouth is made of sheet-iron, which acts as a scoop when the dredge is let down and drawn along the bottom as the boat sails on. The dredge has of late been very extensively used by the naturalist with very important results, among the most remarkable of which are those obtained by the *Challenger* expedition, showing the existence of animal life in great variety at depths where it had before been considered impossible. The ordinary naturalist's dredge is of a lighter construction than that of the oyster fisher, and its meshes should be smaller. For dredging a sandy bottom, the best form of dredge is one like the net used by the Kentish shrimpers. These are twine nets, bag-shaped, and of the length of the boat. The lower side of the mouth of the net is stretched upon a wooden pole, and the other side is held up while the lower is drawn along the bottom. The quantity and variety of animals drawn up by these nets are astonishing. The dredge used for soles resembles the shrimp-net; but all dredges must be modified to suit the bottom on which they are used.

DREDGE (*ante*). Naturalists use an instrument constructed on the general plan of an oyster-dredge for obtaining specimens of animals living at the bottom of the sea, to determine their structure and geographical distribution. In working, the dredge is slipped gently over the side of the boat, either from the bow or the stern. When it reaches the bottom and begins to scrape, an experienced hand upon the rope can usually detect by the tremor of the line when the dredge is passing over an irregular surface. The boat should move not more than a mile in an hour. The dredge may remain down from 15 to 20 minutes, within which time, in favorable circumstances, it may be fairly filled. It comes up variously freighted, according to the locality, and the contents are examined. The scientific value of dredging depends mainly upon two things: the care with which objects procured are preserved and labeled for future identification, and the accuracy with which all the circumstances of the dredging—the position, the depth, the nature of the ground, the date, temperature, etc.—are recorded.

Until the middle of the 18th c. the little that was known of the inhabitants of the sea beyond low-water mark seems to have been gathered almost entirely from objects thrown on the beach after storms, and from the chance captures of fishermen. The dredge was used to aid natural history, first by Otto Frederick Müller, in the researches which furnished material for his *Descriptions and History of the rarer and less known Animals of Denmark and Norway*, 1779. Thenceforward much advance was made in knowledge of deep-sea life, mainly by the efforts of the British association; but the first important undertaking was in the winter of 1872. At that time *The Challenger*, a steam-corvette of 2,306 tons, and 1234 horse-power, was sent out to investigate the physical and biological conditions of the great ocean basins. This vessel was thoroughly equipped, and carried a corps of distinguished scientists. Dredging was done from the main yard-arm. A strong pendant was attached by a hook to the cap of the main-mast, and, by a tackle to the yard-arm, a compound arrangement of 55 to 70 of Hodge's patent accumulators was hung to the pendant, and beneath it a block through

which the dredging-rope passed. The donkey-engines for hauling in the dredging and sounding gear were placed at the foot of the main-mast on the port side. They consisted of a pair of direct-acting high-pressure horizontal engines, in combination of 18-horse power nominal. Instead of a connecting rod to each, a guide was fixed to the end of the piston-rod, with a brass block working up and down the slot of the guide. The crank axles ran through the center of the blocks, and the movable block, obtaining a backward and forward motion from the piston-rod, acting on the crank as a connecting rod would do. This style of engine is commonly used for pumping, the pump-rods being attached to the guide on the opposite side from the piston-rod. At one end of the crank a small-toothed wheel was attached, which drove one thrice the multiple on a horizontal shaft extending nearly across the deck, and about 3 ft. and 6 in. above it. At each end of this shaft a large and small drum were fixed, the larger having three sheaves cast upon it of different sizes; the small being a common barrel only. To these drums the line was led, two or three turns being taken round the drum selected. In hauling in, the dredging-rope was taken to a gin-block secured to a spar on the forecastle, then aft to the drum of the donkey-engine on the port side, then to a leading-block on the port side of the quarter-deck, and across the deck to a leading-block on the starboard side corresponding in diameter with the drum used on the port side, and from this it was finally taken by the hands and coiled. The strain is of course greatest at the yard-arm and the first leading-block, and by this arrangement it is gradually diminished as the line passes round the series of blocks and sheaves. A change made latterly in the handing of the dredge had certain advantages. Instead of attaching the weights directly to the dredge-rope, and sending them down with the dredge, a "toggle," a small spindle-shaped piece of hard wood, was attached transversely to a rope at the required distance, 200 to 300 fathoms in advance of the dredge. A "messenger," consisting of a figure of eight of rope, with two large thimbles in the loops, had one of its thimbles slipped over the chain before the dredge was hung, and the other thimble made fast to a lizard. When the dredge was well down and had taken its direction from the drift of the ship, the weights, usually six 28-lb. deep-sea leads in three canvas covers, were attached to the other thimble of the traveler, which was then cut adrift from the lizard and allowed to spin down the line until it was brought up by the toggle. By this plan the dredge took a somewhat longer time to go down; but after it was adopted not a single case occurred of the fouling of the dredge in the dredge-rope, a misadventure which had occurred more than once before, and which was attributed to the weights getting ahead of the dredge in going down, and pulling it down upon them entangled in the double part of the line.

The great risk in dredging in very deep water is that of the dredge running down nearly vertically and sinking at once into the soft mud, and remaining imbedded until hauling in commences. During the earlier part of the voyage of the *Challenger* this accident frequently defeated, at least partially, the object of the operation; and, after various suggestions for modifying the dredge, it was proposed to try some form of the trawl in order to insure, so far as possible, the capture of any of the larger marine animals which might be present, and thus to gain a better general idea of the nature of the fauna. A 15-ft. beam-trawl was sent down off cape St. Vincent to a depth of 600 fathoms; the experiment looked hazardous, but the trawl duly came up, and contained, with many of the larger invertebrata, several fishes. The trawl seemed to answer so well that it was tried again a little further s. in 1090 fathoms, and again it was perfectly successful; and during the remainder of the voyage it was employed almost as frequently, and in nearly as deep water (3,125 fathoms in the Pacific), as Ball's dredge was in the Atlantic, where the deepest haul was at 3,150 fathoms. During the voyage of the *Challenger*, a course of about 70,000 nautical miles was traversed in three years and a half, and 362 observing stations were established at intervals as nearly uniform as circumstances would permit; and at the greater number of these, dredging or some modification of the process was successfully performed—52 times at a depth greater than 2,000 fathoms, and thrice at depths beyond 3,000 fathoms. So fully convinced were the *Challenger* officers that they could dredge at any depth, that it was only want of time and daylight which prevented their doing so at their deepest sounding, 4,575 fathoms. The Atlantic was crossed five times, and an erratic route through the Pacific gave a good idea of the conditions of the abysses of that ocean, while in the s. Indian ocean dredging and trawling were carried down close to the Antarctic ice-barrier.

The results of this expedition were of the most interesting nature. Animal life was found to exist at all depths, although probably in diminishing abundance as the depth becomes extreme; and in various parts of the world at depths beyond 400 or 500 fathoms the fauna had much the same general character. The species usually differed in widely separated areas, but the great majority of forms, if not identical, were so nearly allied that they might be regarded as representative and genetically related. Although all marine invertebrate classes were represented, echinoderms in their different orders, sponges and *crustacea* preponderated, while corals and *mollusca* were comparatively scarce. In the two groups first named, many forms occurred allied to families which had been previously regarded as extinct or nearly so; thus among the echinoderms, stalked crinoids were by no means rare, and many species of regular *echinidea* related to the chalk genus *echinothuria*, and many irregular species allied to *ananchytes* and *dysaster*,

occurred. The sponges were mainly represented by the *hexactinellidæ*, the beautiful order to which the glass-rope sponge of Japan and the marvelous "Venus's flower-basket" of the Philippines belong, the order to which the ventriculites of the chalk must also be referred.

Dredging at its greatest depth is a difficult and critical operation, and although by its means some idea of the nature and distribution of the abyssal fauna of the ocean has already been attained, it will be long before the blanks are filled up; for of the area of 140,000,000 sq.m. forming the "abyssal province," the actual amount hitherto traversed by the naturalist's dredge may still be readily reckoned by the square yard. [The substance of this article is from *Encyclopædia Britannica*, ninth edition.]

DREDGING-MACHINE, a machine used for clearing out or deepening the channels of rivers, harbors, etc. Dredging-machines are variously constructed, the simplest being like the oyster-dredge described above, only having a perforated cowhide bag instead of the chain-net, and a stronger "spoon" or iron mouth to the bag. This is attached to the end of a pole, and worked with tackle by men from a barge in such a manner that the loose matter of the bottom is scooped up into the barge. The bucket dredging-machine is much more efficient. It consists of a long stage or framework overhanging the side of the barge. This frame has a wheel at each end, upon which works a powerful endless chain, to which is attached a series of perforated iron buckets, each with a shovel-shaped steel mouth projecting considerably on one side. The overhanging framework forms an inclined plane, along which the buckets run, descending on one side, and ascending on the other. They are so arranged that they descend empty, and on reaching the bottom, the projecting shovel or scoop-mouth digs into the bottom, and partially fills the bucket with the silt; it then turns round on the wheel at the lower end of the incline, and runs up it till near the top, when it turns over the upper end, and in doing so its contents are emptied into a second attendant barge. This action is continued by every succeeding bucket of the endless chain. The perforations are for the passage of the water. By varying the inclination of the framework, the working depth may be increased or diminished. Some dredgers are fitted with two complete sets of buckets, one on each side of the vessel. A steam-engine and boiler, suitably placed in the dredger, are provided for giving motion to the machinery, and sometimes also to a screw-propeller placed at the stern. Perhaps nowhere has river-dredging been carried such a length as in the case of the Clyde, which, by this process of scooping, has at and below Glasgow been converted from a river navigable only for small vessels into an estuary capable of bearing the largest ships. The dredgers employed for this purpose are moved by steam, the materials scooped out being carried out to sea by lighters. These have a large open tank amidships, while the two ends are decked over, and afford such accommodation for crew or machinery as may be necessary. The sides of the hold are hinged from the top, and open outwards, and thus its contents can easily be emptied into the sea.

DRED SCOTT CASE. This was a case brought for final decision before the supreme court of the United States in 1856, which excited much interest in America as well as in Europe. The plaintiff was a negro named Dred Scott, who, with his wife and two children, had been held as slaves by a Dr. Emerson, in the state of Missouri. After the death of Emerson, Dred Scott with his family claimed to be free, on the ground that they had resided for some time with their late proprietor in a free territory—so that having, as Scott alleged, been free in that territory, they could not now be held to slavery. The result of the litigation was, that Dred Scott and his family did not become free by having been taken to a free territory, and were accordingly still held to be slaves.

DREIS'SENA, a genus of lamellibranchiate mollusks, generally regarded as belonging to the mussel family (*mytilidæ*), although, whilst the shell very much resembles that of the true mussels, the animal differs in having the mantle closed except at the anal and branchial slits, and a small aperture through which the foot and byssus protrude.—*D. polymorpha* is an interesting mollusk, because, having of late been accidentally introduced into British estuaries and canals, it has fully established itself, and is now abundant in many of them, and in the rivers with which they are connected. Originally, it is believed, a native of the rivers which flow into the Caspian sea and lake Aral, it has extended to the canals and rivers of Germany, Holland, etc. It is capable of living a long time out of water with its valves closed, and it is supposed that it may have come to Britain on timber imported from the continent.

DRELINCOURT, CHARLES, 1595–1669; a French Calvinistic minister at Langres, 1618. In 1620, he went to Paris, and was made minister of the church at Charenton. He wrote a large number of devotional works, which had a wide circulation. His *Catechism*, and *Consolations against the Fear of Death*, became well known in England. His controversial works were also numerous, and did much to consolidate the Protestant party of France. A number of his sons were distinguished as theologians or physicians.

DRENTHÉ, a frontier province of the Netherlands, is bounded on the e. by Hanover, on the n. and e. by Groningen, on the w. by Friesland, and on the w. and s. by Overyssel, in lat. 52° 37′ to 53° 28′ n., and long. 6° 12′ to7° 10′ east. Area, 1024 sq. miles. Pop. '75, 112,221. The soil is in general poor, only about one half of the surface

being capable of cultivation, the remaining portion covered chiefly with heath and morass. The principal crops are rye and buckwheat, but barley and oats are also raised. The inhabitants are chiefly employed in agriculture, pasturage—the cattle reared in D. being famous—and in digging and exporting peat. Two pauper colonies in the w. of the province, the Fredericksoord and Willemsoord, established in 1818, are employed by the state in bringing waste land under cultivation, and in brick-making, weaving, and other occupations.

DRESDEN, the capital of the kingdom of Saxony, situated in a charming valley on both sides of the Elbe, in lat. 51° 3′ 16″ n., and long. 13° 44′ east. It is 116 m. e. of Berlin, and 72 m. e.s.e of Leipsic. It is composed of the Altstadt (Old Town), on the left bank of the Elbe; and of the Neustadt (New Town), on the right or northern bank. D. is a pleasant, though not exactly a beautiful town. It contains several open squares both in Old and the New towns. Pop. '75, 197,295. On account of its architecture and splendid collections in art, it has been justly called the "German Florence." Of the churches, the finest are the Frauenkirche, with a tower 335 ft. in height; the Roman Catholic church (1737–56), with a celebrated organ by Silbermann, and numerous statues and pictures; the Sophienkirche; and the Kreuzkirche, with an altar-piece by Schönau. The synagogue of the Jews, built in the oriental style by Semper, is also worthy of mention. Among the other important buildings may be mentioned the royal palace, a shapeless edifice, begun by duke George, 1534, and completed by Augustus II.; the prince's palace, erected by Augustus II. in 1718; the zwinger, only the vestibule of a palace in the almost too elaborate old French style of architecture, but containing many valuable antiquarian and scientific collections; the theater, the academy, the Brühl palace, etc. The Old and New towns are connected by two bridges, both *chefs-d'œuvre* of architecture.

D. possesses many excellent educational and charitable institutions. The academy of art opened in 1764, to which a school of architecture was added in 1819. This celebrated institution and the musical choir render D. of no small importance to the progress of art in the present day.

The most important branches of industry are gold and silver manufactures, machinery, straw-plait, paper-hangings, excellent painters' canvas, colors, artificial flowers, chocolate, porcelain, etc. An impulse was given to the corn-trade by the opening of the corn exchange in 1850.—The environs of D. are delightful.

The most important of the D. collections are: 1. The royal public library in the Japan palace, amounting to nearly 350,000 volumes. It contains many curiosities, and is particularly complete in the departments of literary history and classical antiquity, as well as in histories of France and Germany. 2. The cabinet of coins, likewise in the Japan palace. 3. The museum of natural history in the Zwinger, particularly complete in the mineralogical department. 4. The historical museum, formed in 1833. 5. The collection of mathematical and physical instruments, likewise in the Zwinger. 6. The renowned picture-gallery, containing upwards of 1500 paintings, mainly by Italian and Flemish masters. Among the former, those especially worthy of notice are the pictures of Raphael ("The Sistine Madonna"); of Correggio ("La Notte," and the "Madonna of St. Sebastian"); of Titian ("The Tribute-money," and "The Venus"); of Andrea del Sarto ("Abraham's Sacrifice"); of Francia; of Paul Veronese; of Giulio Romano ("The Virgin with the Pitcher"); of Leonardo da Vinci ("Francesco Sforza"); of Garofalo, Bellino, Pietro Perugino, Annibale Caracci, Guido Reni, Carlo Dolci, Cignani, etc. Of the Flemish school, the collection boasts 41 pictures by Rubens, 21 by Vandyck, many by Rembrandt, admirable specimens of Snyders, Johann Breughel, Ruysdael, Wouvermann, Gerard Dow, Teniers, etc. Of works of the German school, the gem of the collection is Hans Holbein's Madonna. Of the French school, several pictures by Nicolas Poussin, and some admirable landscapes by Claude Lorraine, are the most remarkable. 7. The cabinet of engravings in the Zwinger is arranged in twelve classes, marking distinct periods in the history of art. 8. The collection of antiques in the Japan palace, including several admirable sculptures. 9. The "green vault" in the royal palace, a valuable collection of precious stones, pearls, and articles wrought in gold, silver, and ivory. 10. The collection of porcelain in the Japan palace.

D. is known in history as far back as the year 1206. It is officially mentioned as a town in 1216. Henry the illustrious selected it for his capital in 1270. From the close of the 15th c., its prosperity gradually increased. Several successive sovereigns contributed to its embellishment, particularly Augustus I. and Augustus II. It suffered severely, however, during the seven years' war; and again in 1813, when Napoleon selected it as the central point of his operations. During the revolution of 1849, also, immense damage was inflicted upon the town, but it is again rapidly improving. D. was occupied by the Prussians in 1866 during the Austro-Prussian war. Since that year the city has been enlarged and made more delightful. New streets have been opened; old irregular buildings have given way to handsome and imposing edifices. The foundation stone of the magnificent new Court theater was laid in 1871.

DRESDEN, Battle of. In Aug., 1813, when the war between Napoleon and the allies, after a short truce, broke out afresh, the armies of the latter gathered from all sides towards Dresden, which they regarded as the key of the French position. It was

held by St. Cyr with a force of about 30,000 men, the main body of the French under Napoleon being in Silesia, where the emperor expected the contest was to be waged. On the 23d, the grand army of the allies appeared before Dresden. The town would in all probability have been quickly stormed, had not Schwarzenberg and the Austrians insisted on waiting the arrival of the left wing under Klenau. This delay saved the French, for at half-past 9, on the morning of the 26th, Napoleon with his guards entered the town. At 4 o'clock in the afternoon, Schwarzenberg, the commander-in-chief of the allies, gave orders for the attack. At various points, the assault was irresistible, but the opportune arrival of the "young guard" enabled Napoleon to hazard a sally, which was as unexpected as it was successful. The allies fell back everywhere; but not dispirited, renewed the fight next day. Towards noon, Moreau was mortally wounded by a cannon-ball at Alexander's side on the height of Räcknitz, and Napoleon obtained a decided advantage over the left wing of the allied army, which Murat, by a skillful maneuver, contrived to outflank, taking 10,000 prisoners, among whom was gen. Metsko. Several other successes in other parts of the field determined the allied armies, especially after hearing that Vandamme was advancing towards Pirne, to retreat, which they did during the night of the 27th Aug. Dresden, however, was not yet delivered from the miseries of war. When Napoleon finally quitted the city on the 7th Oct., nearly 30,000 men still remained behind. As all access was cut off by the Russians, the city suffered severely from famine. A capitulation was at length brought about (11th Nov., 1813) between St. Cyr and Klenau, according to which the garrison were to withdraw unmolested from the 12th to the 16th Nov., on condition that they laid down their arms. The capitulation was nevertheless rejected by prince Schwarzenberg, the garrison declared prisoners of war, and treated as such. The battle of Dresden, as Alison observes, was the *last* pitched battle, on a scale commensurate with his former victories, that Napoleon ever gained.

DRESS, the collective name for the artificial coverings worn in greater or less quantity by all but the most savage of the human race, and always combining the two objects of warmth and ornament. It seems, indeed, from what we read of savage nations, that it is rather in the desire for ornament that the wearing of dress begins, than with a view to protection from cold (see FASHION, under which head some notice will be given of the more singular caprices to which the forms of dress have been subjected; see also CRINOLINE, BLOOMERISM). The earliest coverings would consist of such articles as the skins of animals, and the leaves and inner bark of plants, which, as civilization advances, are mostly supplanted by various textures of wool, flax, silk, and other vegetable and animal substances. Some account of these textures is given under the appropriate heads, and the regulation of dress with a view to health is treated under HEALTH. As will be shown more fully under FASHION, the tendency in modes of dress—notwithstanding occasional aberrations—is towards simplicity and appropriateness.

DRESSINGS, in architecture, is a term loosely used to signify moldings and all the simpler kinds of sculptured decorations.

DREUX, an ancient t. of France, in the department of Eure-et-Loir, is situated on the river Blaise, 23 m. n.n.w. of Chartres, and 45 m. w. of Paris. It is tolerably well built, and lies at the foot of a hill crowned with the dilapidated ruins of an ancient castle, formerly the possession of the comtes de Dreux. From among the ruins rises a beautiful chapel, in the form of a Greek temple, surmounted by a cupola, erected by Louis Philippe. It contains the tombs of two of the children of Louis Philippe, and of others of his relations. The town-hall and the parish church, both handsome specimens of Gothic, are the only other buildings worthy of note. D. has extensive manufactures of coarse cloth, serge, etc., with a trade in sheep and cattle, also various tan-yards, iron-foundries, and dye-houses. Pop. '76, 7,087. In 1562, one of the bloodiest battles recorded in the religious wars of France took place at D., in which the Catholics, under the constable Montmorency, defeated the Huguenots, and took their leader the prince of Condé prisoner.

DREW, a co. in n.e. Arkansas, on Bartholomew bayou, and the head waters of Saline river; area recently diminished to form another co.; pop. '70, 9,960—3,854 colored. It is level and fertile, much of it covered with cypress and ash forests. Productions: corn, cotton, etc. Co. seat, Monticello.

DREW, DANIEL, 1797–1879; b. N. Y. He began life as a drover and dealer in cattle; soon went into the steamboat business, and afterwards into railroads, and became known as one of the boldest and sharpest of speculators in stocks, winning and losing several fortunes. He was always interested in the prosperity of the Methodist Episcopal church, and in proof of that interest founded the Drew Ladies' seminary, at Carmel, N. Y. (his native town), and the Drew theological seminary, at Madison, N. J. Not long before his death he lost his estate.

DREW, SAMUEL, 1765–1833; a native of Cornwall, England, in early life a shoemaker. He became a zealous Methodist, and in 1799, published some *Remarks* on Tom Payne's *Age of Reason*. This was followed by *Remarks on Payne; Essay on the Immateriality and Immortality of the Soul; Essay on the Identity and General Resurrection of the Human Body;* a *History of Cornwall;* and *An Attempt to Demonstrate from Reason and Revela-*

tion the Necessary Existence, Essential Perfections, and Superintending Providence of an Eternal Being, who is the Creator, the Supporter, and the Governor of all Things.

DREW THEOLOGICAL SEMINARY, for the education of Methodist ministers, was founded at Madison, N.J., in 1868, by Daniel Drew, a New York capitalist who gave an endowments of about $500,000. It was organized under the supervision of the Rev. Dr. John McClintock, its first president. The institution is handsomely located, and in 1878, had six professors, and 104 students. J. F. Hurst, D.D., was the president.

DREY'SE, JOHANN NIKOLAUS VON, 1787–1867; a native of Saxony, inventor of the needle-gun. He was the son of a locksmith, and followed the business, adding the manufacturing of tools. In 1836, he completed his invention of the needle-gun, which arm was a few years afterwards supplied to all the German troops He and his family were ennobled in 1864.

DRIFFIELD, GREAT, the chief town in the Wolds, in East Riding, Yorkshire, at the s. base of these hills, near one of the sources of the Hull, 28 m. e. by n. of York, and 20 m. n.n.w. of Hull. It lies in a fertile district, and consists chiefly of one long and broad street. It has a chemical work, flour, and bone-mills, and a considerable corn and cattle trade. Pop. '71, 5,067. Near D. many ancient tumuli have yielded human and horse skeletons, accouterments, flint spear-heads, urns, and a variety of ornaments.

DRIFT, in navigation, is a technical name for the deviation which a ship's course receives by the action of a contrary wind.

DRIFT, a name given to the boulder-clay, a deposit of the pleistocene epoch. More fully, it is called the northern drift, glacial drift, or diluvial drift, in allusion to its supposed origin. For an account of the formation, see BOULDER-CLAY.

DRIFT-WOOD is wood carried by tides and currents to a distance from its native locality. Specimens thus transported have been observed in the marine strata of the chalk, London clay, and other formations.

SAND-DRIFT is sand driven and accumulated by the wind. Deposits thus formed are occasionally found among the stratified rocks, but compared with other strata they are few, though, from their anomalous character, an acquaintance with their phenomena is of importance to the geologist. Moving sands are at the present day, in many places, altering the surface of the land. In the interior of great dry continents, as Africa, India, and Australia, extensive districts are covered with moving sands. The continuous blowing of a steady wind in one direction often covers a rich tract with this arid material. But the influence of the wind on loose sand is most evident along low sandy coasts, where hills, called "dunes," are formed entirely of it; they sometimes attain a considerable height, as much, for instance, as 200 or 300 feet. Dunes are advancing on the French coasts of the bay of Biscay at the rate of about 60 ft. per annum, covering houses and farms in their progress. Similar accumulations are forming on the coasts of Nairn, Cornwall, Wexford, and other parts of the British isles. The Culbin sands, in Nairnshire, cover a large district which at a period not very distant was rich arable land. The prevailing wind is from the w., hence the hills are slowly moving in an easterly direction, at the rate of a mile in somewhat less than a hundred years. A singular stratification exists in these hills. The prevailing w. wind lifts, or rather rolls the particles of sand up the gentle incline of the western aspect of the hill, until they reach the summit, where they fall, forming a steep declivity to the e., equal to the angle of repose for sand. A shower consolidates the surface of the new bed, or a land-breeze carrying the fine dust separates it by a very thin layer of finer material from the one that follows, and thus, as the hill moves eastward, a regular series of strata is formed at a very high angle. Little can be done to arrest the progress of these devastating sand-drifts. It has been recommended to plant *carex arenaria* and similar sand-loving plants, which have long creeping roots: they certainly check to a considerable extent the influence of the wind.

DRILL, *Cynocephalus leucophæus,* a species of baboon (q.v.), a native of Guinea, similar to the mandrill, but rather smaller and less ferocious.

DRILL is a general name for the exercises through which soldiers and sailors are passed, to qualify them for their duties. It is subject to numerous varieties, according to the number and organization of the men drilled at one time, and the kind of weapon to which the exercises relate. The infantry, the cavalry, and the artillery, all have different kinds of drill. The militia and the volunteers differ from the regulars, if not in the kind of D., at least in the circumstances under which it is carried on; the squad-drill, company-drill, and battalion-drill, vary both in the numbers concerned and in the routine of exercises. And so likewise in the navy, the drilling of seamen varies in kind, according to the duties likely to be required.

It is generally considered that four months' D. is required to fit an infantry recruit for service. The progress depends greatly on the intelligence of the men. It is on this ground that the rifle volunteers, enrolled in such large numbers in 1860, have been so advantageously placed; composed almost entirely of young men, whose intelligence has been developed by a moderately good education, the corps have advanced to a degree of proficiency which has attracted the marked attention of military officers.

Manuals of D. have been prepared for all the various branches of the two services. Drill-halls, in which D. can be carried on comfortably in any kind of weather, are now common.

DRILL, a fine linen fabric of a satiny finish, used for summer dress for gentlemen. Drills are worked with five shafts, except fancy patterns, which are wrought with eight shafts.

DRILLING-DRILL. Drilling is the name applied to the mode of sowing in regular rows, as distinguished from broadcast sowing, and the drill is the name of the implement employed in this process; the term *drill* is also frequently applied to a row of drilled crop, as a drill of potatoes, corn, or turnips. In all countries in which maize and Indian corn are grown, the principle of drilling has been long known and acted upon. In gardening it has been practiced everywhere from time immemorial; but its extension to field-culture is comparatively of recent date. Jethro Tull invented a drilling-machine in the early part of last century, and did much to show its merits in the culture of grain and root crops. Since his time, the use of this implement, in the case of both white and green crops, has in many districts become general. The crops which are now most generally drilled, are clover, flax, cereals, beans, pease, potatoes, turnips, beet-root, cole-seed, and carrots. Of these, clover and flax are sown in drills at about 3 or 4 in. apart; cereals from 6 to 12 in.; and beans, potatoes, and turnips at from 25 to 30 in. apart; the general rule, however, with most green crops, being that the space between the rows should admit of the passage of a light plow or hoe, drawn by a horse, without danger to the plants. A great variety of drills are now in use. The system of lifting the grain in small cups and conveying it to the coulters has been long in use. Garrett of Saxmundham, Suffolk, and Hornsby of Grantham, are favorite makers of corn and turnip drills. Latterly, R. Reid & Co. of Aberdeen have acquired fame with their patent disk corn-drill, which is popular in Scotland and some parts of England. One powerful recommendation of drilling is, that by means of it a considerable saving of seed is effected in the sowing of white crops; but the great advantage is, that in the case of green crops, it enables the farmer more readily to clean the land, both by the hand and by the horse hoe. About one-half the seed suffices when deposited by the drill-machine, compared with what the hand-sowing requires, and the seed is more regularly spread and better covered. The braird comes up more uniformly, and the straw is stronger and stiffer. Drill-sowing is slow work, but it is so efficient that it is gaining on the broad-cast. To keep the soil stirred and pulverized, which can only be properly done where the crops have been drilled, favors the retention and absorption of the moisture.

In England, turnips are sometimes drilled by a machine on the flat; while in Scotland, they are always sown on ridges or drills formed by the double-molded plow. The double-board or drill plow is to be found now on almost every farm, and its introduction has saved much labor. Turnip-sowing machines which take two drills at the time have been common for years, and potato-planters taking two rows at the stripe are being introduced, but have not been established yet. One of these was tried, with interest and success, at the Royal English Show, held at Hull, in 1873.

DRILLS are tools used for boring or drilling holes in metal, bone, ivory, hard woods, etc. They are usually made of a square steel bar, flattened out at the cutting end; this part is brought to an angular point like a spear-head, and the cutting edges forming the angle are beveled in opposite directions. Those which have a projecting pin in the center, and chisel-shaped cutting edges on each side of the pin, are called "center bits." There are various contrivances by which the drills are made to revolve. For drilling iron, steel, and large brass work, the lathe is commonly used, the drill being fitted into a square-hole chuck, and the work pressed against it while revolving by the screw and center of the puppet. The *brace* or *drill-stock* is commonly used by carpenters for center bits, and occasionally for metal work. This is a curved handle, which is made to revolve by the hand, while one end is pressed against the chest. Small drills for metal work are mounted with a *ferule* or pulley, or are fitted into a stock with such a pulley on it; a piece of cane or spring-steel is mounted with a string like an archer's bow, but loose enough to wind round the ferule. By drawing the bow lengthwise, the drill is made to revolve, and is at the same time pressed against the work by means of a *breast-plate*, which is held against the chest of the workman; this breast-plate has indentations upon it, which serve as sockets, into which the end of the drill-stock or drill works.

DRIMYS. See WINTER'S BARK.

DRINKING USAGES. Some of these are of great antiquity, and all are interesting in connection with the history of manners. Besides sacrifices of animals and articles of food, the Hebrews made drink-offerings a solemn religious service. To mark the spot where he communed with God, Jacob set up a pillar of stone, and "poured a drink-offering thereon."—Gen. xxxv. 14. We learn that such sacrifices were not made alone to the true God; for women are said to have poured out "drink-offerings unto other gods."—Jer. vii. 18. Such a statement is amply verified by pagan writers. Among the Greeks and Romans, the pouring out of a libation to the gods was a common religious observance. A libation was made on the occasion of solemn prayers, and also

before meals. These libations were usually of undiluted wine, but they were also sometimes of milk diluted with water, or water flavored with honey. There are many references to these libations by Sophocles, Æschylus, Pliny, and other writers. The libation at meals consisted of pouring a small quantity of liquor from the cup on the ground—so much waste being a kind of propitiation, or an act somewhat equivalent to the asking of a blessing. See SACRIFICE.

From these and similar usages in remote times sprung the ceremonial observance of drinking healths, or the uttering of a pious, heroic, or friendly sentiment before quaffing liquor on festive occasions. It has been stated that the practice of saying, or pledging "I pledge you," originated in England in the 10th c., it being then necessary for one to watch over the safety of his companion when the cup was at his lips. But the custom of drinking healths, as just mentioned, is of far higher antiquity, and was derived immediately from the boisterous convivialities of a Scandinavian and Teutonic ancestry (see VALHALLA), if not with equal likelihood from the usages of the early Britons, who were of Celtic origin. A story is told of a feast given by Hengist (5th c.) at his stronghold of Thong-caster, in Lincolnshire, to the British king Vortigern, and of the bewitchment of the royal guest by the charms of Rowena, the young and beautiful daughter of his entertainer. Rowena's address, as she gracefully knelt and presented the wine-cup to the king, *Liever kyning, wass heal*, or, "Dear king, your health," is often quoted as the origin of our still existing expressions, wassail and wassail-cup; though wassail means pledging or health-drinking independently of the saying of Rowena, and certainly was not then uttered for the first time. Wassail is derived from the old Anglo-Saxon *Wæs hæl*, "Be in health;" and *Wæs heil* and *Drinc heil* were the usual ancient phrases in quaffing among the English, and synonymous with "Here is to you," and "I'll pledge you," of later times. The explanation of wassail by an old writer, Robert de Brunne, may be appropriately quoted:

> "This is ther custom and her gest
> When thei are at the ale or fest,
> Ilk man that levis qware him think
> Salle say *Wosseille*, and to him drink.
> He that biddis salle say, *Wassaile*,
> The tother salle say again, *Drinkaille*.
> That says Wosseille drinkis of the cop,
> Kissand his felaw he gives it up."

The learned Selden, in a note on the *Polyolbion*, says: "I see a custom in some parts among us; I mean the yearly was-haile in the country on the vigil of the new year, which I conjecture was a usual ceremony among the Saxons before Hengist, as a note of health-wishing (and so perhaps you might make it wish-heil), which was exprest among other nations in that form of drinking to the health of their mistresses and friends. 'Bene vos, bene nos, bene te, bene me, bene nostram etiam Stephanium,' in Plautus, and infinite other testimonies of that nature in him, Martial, Ovid, Horace, and such more agreeing nearly with the fashion now used; we calling it a health, as they did also in direct terms." For further particulars concerning wassail and wassail-bowl, we may refer to Brand's *Popular Antiquities*, edited by Ellis. It is enough here to quote from that authority the following passages: "Milner on an ancient cup (*Archæologia*, xi. 420), informs us that 'the introduction of Christianity amongst our ancestors did not at all contribute to the abolition of the practice of wasselling. On the contrary, it began to assume a kind of religious aspect, and the wassel-bowl itself, which in the great monasteries was placed on the abbot's table, at the upper end of the refectory or eating-hall, to be circulated amongst the community at discretion, received the honorable appellation of "poculum charitatis." This, in our universities, is called the grace-cup.' The poculum charitatis is well translated by the toast-master of most of the public companies of the city of London by the words a 'loving cup.' After dinner, the master and wardens 'drink to their visitors, in a loving cup, and bid them all heartily welcome.' The cup [a silver flagon containing warm spiced wine] then circulates round the table, the person who pledges standing up whilst his neighbor drinks to him."

While the drinking of healths is thus of old date, the application of the word "toast" is modern, having had its origin in the practice of putting a piece of toasted bread in a jug of ale, hence called "a toast and tankard." The custom of so using the word is said to have had its rise at Bath, in the reign of Charles II. It happened that on a public day a celebrated beauty of those times was in the cross [or large public] bath, and one of the crowd of her admirers took a glass of the water in which the fair one stood, and drank her health to the company. There was in the place a gay fellow half-tipsy, who offered to jump in, and declared, though he liked not the liquor, he would have the toast. He was opposed in his resolution; yet this whim gave foundation to the present honor which is done to the lady we mention in our liquors, who has ever since been called a toast.—*Tatler*. Begun in the form of toasting beauties at private parties, toasts were in time given on all sorts of subjects at public festivities, accompanied with rounds of cheers and hurrahs, these noisy demonstrations being now called "the honors." The fatigue of announcing these exciting sentiments is so great, that in all well-ordered large assemblies a toast-master is employed. Standing behind the chairman, this official, besides proclaiming the toasts, acts as a fugleman to regu-

late the clapping of hands and the "hip, hip, hurrahs" of the company. "Toasts, certainly, in this guise look more like a medium for taking an indefinite quantity of wine, than that spontaneous effusion of the heart in honor of some cherished individual, which they originally were. On certain occasions, these signals are hushed, and the convivial glass is taken "in solemn silence." The effect is certainly rather startling. A convivial glass to the memory of one departed has surely something in it of practical absurdity."—Mrs. Stone's *Chronicles of Fashion* (1845). The absurdity of the whole toasting system has incurred the reprehension of temperance societies, without any perceptible abatement; but the old custom of drinking healths at private parties is now given up in good society, along with the excesses which were formerly practiced.

Space is not afforded in the present work to do more than glance at the diversity of D. U. in connection with domestic events and social intercourse. There were, as is well known, at one time drinkings on the occasion of births, baptisms, marriages, and even deaths; these last, which included the gloomy festivities of the *Lykwake*, or wake over the corpse of the deceased, being a relic of a very ancient custom, as was that, at least in Scotland, of drinking the *dredgy* (dirge) after the funeral solemnities were completed. In whatever manner these, as well as many other D. U., originated, it cannot be doubted that they were long maintained from the force of custom, along with that demand for artificial stimulus provoked by the naturally phlegmatic character of a northern people. For the long nights of a cheerless climate, there seems to have been sought the solacement of those intoxicating agents, in which it would have been fatal to indulge—where they were not needed—under the sunny skies of the south. We believe this is really the philosophy of the subject, if there be any philosophy in it; and it cannot fail to be observed, that just in proportion to an increase in the number of comfortable homes, the cultivation of mental resources, and the spread of a taste for harmless recreations, the more odious of the old convivialities disappear. Latterly, many amusing traditions respecting the drinking habits of a past age in Scotland, where they longest flourished without alteration, have been given in the *Memoirs of Lord Cockburn;* the *Autobiography of the Rev. Dr. Alexander Carlyle;* and the *Reminiscences of Scottish Life and Character*, by the Very Rev. Dean Ramsay (1860).

As regards miscellaneous drinking observances at one time common, we can refer but to a few of the more prominent. Perhaps the most offensive of all was that customary among tradesmen of imposing fines to be consumed in liquor. Apprentices, on being introduced to a workshop, paid so much entry-money to be spent in drink, and similar exactions were made from journeymen on entering a new employment. This was called paying their *footing*. When Benjamin Franklin, on his getting employment in a printing-office in London, refused to comply with this mischievous custom, he experienced, as he tells us, a variety of petty annoyances. Among shipwrights, the penalty of non-payment was flogging with a hand-saw from time to time, and other maltreatment. We refer to Dunlop's *Drinking Usages of Great Britain* (1839) for many curious details of this kind. Happily, the abolition of these usages has kept pace with the increasing intelligence of the working-classes, and of such outrages little is now heard. Prisoners, on being lodged in jail, as related in the novels of Smollett and others, were obliged to pay *garnish* for drink to the brotherhood of which they had become members. This pitiless exaction is now totally gone, through the efficacy of modern prison-discipline.

The giving of *vails* (Lat. *vale*, farewell) to servants on quitting a gentleman's house, which became so intolerable in the 18th c., as at length to be given up by universal consent, meant, doubtless, a gift to be spent in drink to the health of the donor, and was analogous to the custom of giving a *trink-geld* in Germany, and a *pour boire* in France, to servants, drivers of carriages, and others. There were, at one time, numerous drinking usages connected with departures. We need only notice the *bonaïlie* (Fr. *bon allez*), or, as it is sometimes called, a *foy* (Fr. *voie*), a festive drinking at the away-going of servants or of persons in a still higher degree, once common in the lowlands of Scotland; also the *stirrup-cup*, or, as it is called in the Highlands, *deoch an dorris*, or drink on getting on horseback, and being ready to set off.—For the moral and physical evils connected with D. U., and the means taken to redress them, we refer to the article TEMPERANCE. W. C.

DRIP, the projecting edge of a molding, so channeled as that the rain will drip from it instead of trickling down the wall.—*Parker*.

DRIPSTONE (Fr. *larmier*). The D. is a projecting molding or tablet placed over the head of a Gothic doorway or window, for the purpose of throwing off the water, whence it is also known as a water-table or weather-molding. Though such was, no doubt, its primitive use, the D. latterly became a mere ornamental appendage, which served to enrich and define the outline of the arch. It does not generally extend lower than the springing of the arch, though this rule is by no means without exceptions. When the tracery extends to a lower level, the external D. usually accompanies it, and Parker mentions that, at the n. doorway of Otham church, Kent, it descends the whole length of the jamb. The D. is not so constant a feature in continental as in English Gothic.

DRISLER, HENRY, LL.D., b. 1818; graduated at Columbia college, 1839, and was instructor in the grammar school there for several years; then teacher of Greek and Latin; in 1845, adjunct professor in the same department; in 1857, professor of Latin, and in 1867, of Greek. In the latter year, during president Barnard's absence in Europe, he was president *pro tem.* of the college. He afterwards for several years assisted prof. Anthon in editing his classical text-books. Besides many minor contributions to linguistic study, he has edited (1846) Liddell and Scott's translation of Passow's Greek Lexicon, and (1870) an enlargement of Yonge's English-Greek Lexicon.

DRIVER, on shipboard, is the name of a large sail occasionally set upon the mizzen-mast with a yard or gaff. A boom, called the *driver-boom*, extends the lower part of the sail a good way over the stern, like a cutter's mainsail.

DRIVING, FURIOUS. This, which was often an offense at common-law, is made a statutory offense by 24 and 25 Vict. c. 100, s. 35, so that if any person shall suffer any bodily harm, by reason of the wanton and furious driving or racing, or by the willful misconduct of any coachman, or other person having the charge of any carriage or vehicle in any place, the offender shall be guilty of a misdemeanor, punishable by two years' imprisonment. Special penalties were often put in general and local road acts; and 2 and 3 Will. IV. c. 120, by which the laws relating to stage carriages and horses let for hire were consolidated, enacts that any driver, conductor, or guard, guilty of furious driving, shall forfeit £5 (s. 48). The owners are liable for the penalty where the driver or guard is not known, or cannot be found. As to cabs, see HACKNEY-COACHMEN. Within the metroplis they are regulated by 1 and 2 Will. IV. c. 22, and other statutes, including 32 and 33 Vict. c. 115.

DROGHEDA (Ir. "bridge of the ford"), a well-built parliamentary and municipal burgh and seaport, in a county by itself of 9 sq.m., on the borders of Meath and Louth, on both sides, but chiefly n. of the Boyne, 4 m. from its mouth, and 31 m. n. of Dublin. The Dublin and Belfast railway crosses the Boyne here by a viaduct 95 ft. high. There are linen and cotton manufactures, tanning and brewing works, and an iron foundry. It has a considerable trade, chiefly with Liverpool, 140 m. e.s.e., principally in corn, meal, flour, cattle, provisions, linen, hides, and butter. Great quantities of ale are sent to the colonies. Vessels of 500 tons reach the quay, and barges of 50 tons ply 19 m. up the Boyne to Navan. Pop. '71, 13,510, of whom 12,381 are Roman Catholics, 855 Episcopalians, 152 Presbyterians, the rest of other denominations. D. sends one member to parliament. The parts of D. on the opposite sides of the river formed two opposing corporations till 1412, when a sermon by a monk induced them to get a charter of union from Henry I. From the 14th to the 17th century, D. was the chief military station in Leinster. Many parliaments were held in D., and it had the right to coin money. In 1649, Cromwell stormed D. and put 2,000 of the garrison to the sword. Poyning's laws were enacted here. D. surrendered to William III. the day after the battle of the Boyne, which was fought in 1690 at Oldbridge, 4 m. w. of Drogheda. One of the four ancient gates of D. still remains, and the ruins of many friaries and monastic institutions. The port is under a board of commissioners, whose revenue in 1875 was £3,606. In 1875, 706 vessels, of 116,795 tons, entered, and 402, of 104,524 tons, cleared the port.

DROGUE AMÉRE (Fr. bitter drug), a celebrated stomachic bitter; of which the basis is creat root, and the other ingredients mastic, frankincense, myrrh, and aloes, all steeped for about a month in brandy, which is then strained and bottled.

DROHOBICZ, a t. of Austria in the province of Galicia, is situated on the Tyszmanika, a tributary of the Dniester, in lat. 49° 25′ n., and long. 23° 30′ east. The town is in general ill-built, but it contains several interesting edifices, including a Basilian monastery, a castle, a high school, and two very handsome churches. D. has extensive salt-works, which produce about 3,700 tons of salt yearly. There are also in the vicinity iron-mines and pitch-wells. D. has likewise a good trade in wine, linen, cotton, leather, and grocery. It has, besides, corn and cattle markets. Pop. '69, 16,884, seven eighths of whom are Jews, who carry on most of the commerce of this town.

DROIT D'AUBAINE (Lat. *alibi nati*). By the old custom of France, the king was entitled, on the death of a foreigner who had taken up his fixed residence there, to claim his movable estate, notwithstanding any testamentary settlement which he might have left. But when a foreigner went to France as a traveler, merchant, or foreign minister, without any intention of fixing his residence there, the droit d'aubaine was excluded. The Swiss, Savoyards, Scotch, and Portuguese were exempted. This antiquated piece of injustice was abolished in 1819.

DROITS OF THE ADMIRALTY. See ADMIRALTY DROITS.

DROITWICH, a parliamentary and municipal borough in Worcestershire, containing four parishes and three churches, 7 m. n.n.e. of Worcester, in the narrow valley of the small river Salwarp, on the Bristol and Birmingham and West Midland railway, and on a canal connected with the Severn, which admits vessels of 60 tons. It has direct communication, also, by means of other canals, with Birmingham and London and the intermediate district. Its chief trade is salt, for which it has been famous from remote times, and which is esteemed the best in Europe. In the middle of the town, rising from a

depth of 200 ft., through beds of new red sandstone and gypsum, are the celebrated wyches, or brine-springs, yielding over 115,000 tons of salt a year, nearly the half of which is exported to foreign countries. Pop. '71, of the municipal borough, 3,504; of the parliamentary, 9,510. D. sends one member to parliament. It was the Roman salinæ. The remains of a villa were found here, with tesselated pavements, etc.

DROME, a department of France, on the e. bank of the Rhone, to the s. of the department of Isere. Area, 2,500 sq. miles. Pop. '76, 321,756. In the w. of the department, running from n. to s. along the Rhone, stretches a sandy plain of 5 to 8 m. in breadth, but toward the e. the surface is hilly; a spur of the Alps traversing the eastern boundary, and sending offshoots of about 3,500 ft. in average height westward across almost the entire area of Drome. These heights, whose sides are covered with forests of pine, oak, and beech, afford excellent pasturage in summer and autumn. The general direction of the rivers of D. is westward, toward the Rhone, and the most notable of them are the Drome, from which the department takes its name, and the Isere. Vines and mulberry, chestnut, walnut, and olive trees are extensively grown. About 8,600,000 gallons of wine are produced annually. Many of the vineyards are famous, but perhaps the most celebrated is that of L'Hermitage, near Tain, on the banks of the Rhone, which yields red and white wines hardly surpassed by any in the world. D. has several iron-mines, also copper, lead, and to some extent coal. The manufactures consist chiefly of woolen cloth, silk, hosiery, serge, and cotton yarn. The department is traversed by the Lyon and Avignon railway. It is divided into the four arrondissements of Valence, Montélimart, Die, Nyons, with the town of Valence for capital.

DROMEDARY, a name sometimes given, probably at first through mistake, to the Arabian or one-humped camel (*camelus dromedarius*), but properly belonging to a variety of that species, distinguished by slenderness of limbs and symmetry of form, and by extraordinary fleetness. It has been well described as "bearing much the same relation to the ordinary camel as a race-horse or hunter does to a cart-horse." The word dromedary is derived from the obsolete Greek *dremo*, to run. The pace of the D. is a trot, which it can maintain without intermission for a prodigious length of time; often at the rate of 9 m. an hour for many hours together; whilst a journey of upwards of 600 m. is performed at a somewhat slower rate in five days. Even its more rapid pace can be maintained for twenty-four hours at a stretch, without sign of weariness and without stopping to bait; and if then it is allowed a little refreshment, of a ball of paste made of barley and powdered dates and a little water or camel's milk, it will resume its journey, and go on with undiminished speed for twenty-four hours more. The jolting to the rider is terrible. The gallop is a pace unsuitable to the D., and at which it very soon fails. Dromedaries are sometimes trained to run races. White dromedaries are particularly prized in some parts of the east. See CAMEL.

DROMORE (*Druim Mor*, Great Ridge), an episcopal city in the n.w. of the co. of Down, on the Lagan, 14 m. s.w. of Belfast. It has linen manufactures. Pop. '71, 2,408. In the peat-bogs here were found the remains of an elk, the space between the extremities of whose horns measured 10 ft. 3 inches. North of D. is a mound or rath, 60 ft. high, with three concentric intrenchments, and great outworks towards the Lagan. The see of D. was founded by St. Colman in the 6th c., but is now united with those of Down and Connor. Jeremy Taylor, when bishop here, built the present church.

DRONE. See BEE.

DRONTHEIM. See THRONDHJEM.

DROORAJAPATAM, or DOOGOORAUZEPATAM, a t. on the Coromandel coast of Hindustan, possesses remarkable facilities for navigation, both maritime and inland. It stands on an inlet, which connects Blackwood harbor with Pulicat lake, the former being the only safe haven on the w. side of the bay of Bengal, and the latter being artificially continued as far as Madras. The place is 60 m. to the n. of Madras, and 34 to the s. of Nellore, in lat. 13° 59′ n., and long. 80° 13′ east.

DROPSY (Gr. *hydrops*, from *hydōr*, water), a class of diseases always of serious import, though not often, perhaps, directly fatal. D. is rather a symptom than a disease; it consists of the effusion of watery fluid from the blood into the skin and subjacent textures, or into the cavities of the body. When the effusion is chiefly in the superficial parts, the D. is called anasarca (*ana*, upon; *sarx*, the flesh); when it is in the abdomen, it is termed ascites; when in the chest, hydrothorax. D. most commonly depends on disease of the heart (q.v.) or kidneys (q.v.); in cases of ascites, the liver and spleen are often at fault. The treatment of D. is chiefly by diuretics (q.v.), and other evacuant remedies, which remove the fluid from the textures by unloading the blood of its excess of serum. It is, however, a matter of some difficulty to find the proper remedy in each individual case. In all cases of D., the internal organs should be, if possible, submitted to a strict medical examination, and the treatment regulated accordingly.

DROPSY (*ante*). It cannot be too clearly borne in mind that a dropsy is a transudation and not an exudation, and is not a direct product of inflammation, as the latter is. For instance, the fluid which is poured into the cavity of the pleura in pleurisy is not a dropsy, but an exudation of plastic material from the blood, which has the prop-

erty of becoming organized into a kind of pseudo-tissue which forms adhesions between the lungs and the sides of the chest. In dropsy, the fluid has no power of organization, although it contains a slight portion of constituents of blood serum. Exudations have a turbid appearance when they are not colored with the red corpuscles of the blood, but the effused transuded fluid of dropsy is usually quite transparent, although sometimes tinged with the coloring matter of the blood. As a rule, dropsies are caused by obstructions to the return of blood by the veins, and may be general or local. In general dropsy there is an accumulation of watery fluid into the cellular tissue of a part or whole of the body, together with a transudation into one of the serous cavities. Such dropsies are apt to follow diseases of the heart (q.v.). Again, general dropsy may be owing to a morbid condition of the blood in diseases of the kidney (q.v.). It is then called *renal* dropsy, while that caused by disease of the heart is called *cardiac* dropsy. Local dropsies, when existing in the cellular tissue, are circumscribed. Thus, anasarca confined to the limbs would be called a local dropsy, whereas when spreading over the whole body it would be called general, although the cellular tissue only is invaded. For the causes of dropsy of the belly, or *ascites*, see more particularly LIVER, DISEASES OF THE. But ascites, as well as dropsy of other cavities than the peritoneum, may be the result of scarlet fever, which has for one of its sequelæ inflammation of the kidneys. The pressure of a tumor may cause dropsy. Pressure upon the portal vein may be followed by ascites; upon the ascending *vena cava*, or great vein which carries the blood from the trunk and lower extremities to the heart, anasarca of the trunk and lower extremities. When the pressure is upon one of the iliac veins, anasarca of one of the lower limbs is the consequence. The treatment of dropsy depends upon the condition of the organs or parts of the body where morbid condition is its cause. Renal dropsy, besides general treatment, will require remedies calculated to relieve the renal disease, and a similar remark applies to hepatic dropsy. The general treatment for all forms of dropsy includes sometimes the removal of the watery fluid from the serous cavities, and also from the cellular tissue. This is sometimes accomplished by tapping, or *paracentesis*, when the liquid is drawn from a cavity; when from the abdomen, *paracentesis abdominis;* when from the chest, *P. thoracis;* when from the head, *P. capitis.* The withdrawal of the liquid from the cellular tissue is performed by making numerous small punctures. The therapeutical remedies consist of diaphoretics, diuretics, and cathartics; and although they are often employed with more or less benefit, and sometimes assist in recovery, they frequently fail to give the hoped-for relief. Cathartics, especially those which belong to the class called *hydrogogue*, often reduce the amount of liquid considerably; but it generally returns, especially in incurable cases, and the patient is made weaker by the operation; and similar objections hold with regard to diuretics; they often relieve for a time, but are perhaps quite as often unsatisfactory. Both remedies in unfavorable cases may be called necessary evils. Diaphoretics may be given with more freedom, although the objection that they promote debility to a certain extent applies to them also. The use of jaborandi, or its alkaloid, which has been recently introduced into practice in this country, is perhaps attended with more benefit than that of any other diaphoretic. (See JABORANDI.)

DROPWORT. See SPIRÆA and WATER DROPWORT.

DROSERA'CEÆ, a natural order of exogenous plants, consisting entirely of herbaceous plants, which generally inhabit marshy places, and are often covered with glands. The leaves are frequently all radical, and they and the flower-stalks are rolled up in bud like the fronds of ferns. There are 5 sepals, 5 petals, 5, 10, 15, or 20 stamens; the fruit a one-celled capsule, with numerous seeds. About 100 species are known, distributed over most parts of the world, many of them plants of very delicate appearance; and many of them, as the species of *drosera* or SUNDEW, natives of Britain, are remarkable for their glandular hairs, which secrete a viscid fluid, and by means of it often fatally detain flies which alight on them. *Rosidula dentata* is placed in houses in s. Africa on this account. Venus' fly-trap belongs to this order. See DIONÆA. Acrid and stimulant properties prevail in the droseraceæ.

DROSOM'ETER, an instrument for measuring dew. It is a simple balance in even poise, on one scale of which the dew falls, while the other is protected. The weights on the dry scale indicate the amount of dew on the wet scale.

DROSTE-HÜLSHOFF, ANNETTE ELIZABETH, a distinguished lyric poetess of Germany, b. 12th Jan., 1798, on the estate of Hülshoff, near Münster. Of a delicate constitution, and living in complete seclusion from the world, she nevertheless received an excellent scientific education. In the year 1825, she was first introduced into a wider circle of distinguished men and women at Cologne and Bonn, but in a short time retired again to her maternal estate of Rischhaus, near Münster, where she lived almost exclusively for science, nature, and poetry. She died at a place near lake Constance, 24th May, 1848. While occupying a distinguished place among the literary women of the time, she retained all the characteristic timidity of her sex, avoiding those eccentricities into which many women fall who think they have a mission to regenerate society. Her *Gedichte* (Poems) appeared at Stuttgart in 1844, and of her posthumous works *Das geistliche Jahr nebst einem Anhang religiöser Gedichte* at Stuttgart in 1852.

The poems are not only perfect as regards form, but unite a womanly gentleness and poetical creative power in a degree seldom seen in the writings of women.

DROUET, JEAN BAPTISTE, Comte D'ERLON, French marshal, was b. 29th July, 1765, at Rheims, entered a regiment of volunteers in 1792, and took part during the years 1793–96 in the campaigns of the Moselle, Meuse, and Sambre. His important services quickly obtained him promotion. His conduct in the peninsular war was highly distinguished, and elicited the warmest eulogiums from Massena. After the fall of Napoleon, the Bourbons tried to secure his services, and gave him the command of the 16th division, but he was shortly after arrested on the charge of conspiring against the royal family. Managing to escape, he remained in concealment in Lille until the return of Napoleon from Elba, when, putting himself at the head of the troops, he seized the citadel and held it for the emperor, who made him a peer of France. At the battle of Waterloo he commanded the first *corps d'armée*. After the capitulation of Paris, he fled to Bavaria, where he resided until the July revolution, when he returned to France, and received in 1832 the command of the army of Vendée. During 1834–35, he held the important office of governor-general of Algeria, and in 1843 was elevated to the rank of marshal. D. died 25th Jan., 1844.

DROUET D'ERLON, JEAN BAPTISTE, 1765–1844; Count, and marshal of France, governor of Algeria. He was an eminent soldier, serving at the siege of Valenciennes, Quesnoy, and Condé, in the blockade of Ehrenbreitstein, at Zurich, Schaffhausen, and Constance. As general of division he was distinguished at Ulm and Hohenlinden. He was wounded at Friedland, made an officer of the legion of honor, and a peer. He served in the peninsular war. In 1834, he was appointed governor of Algeria, and in 1843 was made a marshal.

DROUYN DE LHUYS, EDOUARD, an eminent French diplomatist and politician, was b. at Paris, Nov. 19, 1805, and studied at the college of Louis-le-Grand and the ecole de Droit. He was at first attached to the embassy at Madrid, whither he proceeded in 1830. In 1840, he was placed at the head of the commercial department under the minister of foreign affairs, and shortly after was elected *député* for Melun; but taking a part hostile to the government, of which he was a subordinate member, he was deprived of his situation by M. Guizot. This gave him fuller scope for the advocacy of his political opinions. He now became an active member of the *Reforme* party, and after the famous banquet of the 12th arrondissement had been interdicted, he signed, along with the other chiefs of the opposition, the accusation drawn up against M. Guizot and his colleagues. Elected representative of the people to the constituent and legislative assemblies, by the department of Seine-et-Marne, he was made first a member and then president of the committee of foreign affairs. Here he acted generally with the moderate party. In the first cabinet formed by Louis Napoleon after his election to the presidency (Dec., 1848), he became minister of foreign affairs, and directed the French policy in all the difficult European complications of the year. In 1849, he went to London for a short time as ambassador, and after the *coup d'état* became one of the vice-presidents of the imperial senate, and again minister of foreign affairs. Being disappointed at the issue of the Vienna conferences in 1855, he resigned his office. In 1863, he was recalled to his old post, resigning again in 1866. On the fall of the empire, he fled for a time to Jersey.

DROWNING. See ASPHYXIA.

DROWNING, as a mode of capital punishment, has only lately ceased in Europe, and is probably still in use in some other quarters of the world. Tacitus, writing about the end of the 1st c., tells us that the Germans hanged their greater criminals, but that meaner and more infamous offenders were plunged under hurdles into bogs and fens. By the law of the ancient Burgundians, a faithless wife was to be smothered in mud. The Anglo-Saxon codes ordered women convicted of theft to be drowned. The punishment was in such common use throughout the middle ages, that grants of capital jurisdiction ran "*cum fossa et furca*," i.e., "with pit and gallows." The pit, ditch, or well, was for drowning women; but the punishment was occasionally inflicted on men. The doom of the parricide was to be put into a sack and cast into the sea. A canon of Prague, afterwards enrolled in the catalogue of saints, was drowned in 1383, for refusing to reveal the secrets of the confessional. In this instance, perhaps, drowning was allowed to the offender as a matter of favor. So in Scotland, in 1556, a man convicted of theft and sacrilege, was sentenced to be drowned, "by the queen's special grace." So lately as 1611, a man was drowned at Edinburgh for stealing a lamb. By that time, the punishment of drowning had become obsolete in England. It survived in Scotland until 1685. The last execution by drowning in Switzerland was in 1652, in Austria in 1776, in Iceland in 1777. It was abolished in Russia early in the 18th century. In Saxony, a woman convicted of child-murder, was sewn up in a sack, along with a cat, a dog, and a snake, and thus drowned, in 1734.

DROYLSDEN, a large and rapidly increasing Lancashire township, a district parish of Manchester, and 4 m. e. from Manchester, a station on the Lancashire and Yorkshire railway. It is situated on an elevated plain, is irregularly built, the houses of brick,

but many of them very neat. The cotton manufacture is extensively carried on; there are also print-fields, dye-works, and copperas-works. Pop. '71, 6,768.

DROY'SEN, JOHANN GUSTAV, b. 1808; a German historian, studied at Stettin and Berlin, teacher in a gymnasium in the latter city, and private tutor in the university. In 1840, he became professor of history at Kiel, and was prominent in politics during the struggle between Denmark and the duchies, being the author of the *Kiel Address*, and one of the nine protesting professors of the university. He was a representative from Kiel in the diet of Frankfort, and subsequently a member of the Frankfort parliament. In 1851, he was professor of history at Jena, and in 1869, filled the same position in Berlin. He made a number of translations from the Greek, and has written several books on modern history.

DROZ, FRANÇOIS-XAVIER JOSEPH, 1773–1850; a French writer on morals and politics, who studied law in Paris. In 1799, he published an essay on the art of oratory; some years later, the romance of *Lina*, other essays, works on moral philosophy, on the science of life, and on the application of morals and philosophy to politics and political economy; also on Christianity, and an elaborate history of the reign of Louis XVI. He was a member of the academy.

DRUGGET, a common felt or other coarse woolen fabric, chiefly used for covering carpets, or as a substitute for a carpet. At one time, also, it was largely used as an aticle of clothing by the humbler classes, and even yet the *drugget petticoat* is far from uncommon, although it is gradually giving place to cotton fabrics, which have the advantage of greater cleanliness, and of being less liable to retain infectious and contagious poisons.

DRUGS, a name applied to all material agents used in the treatment of disease, when in their crude or commercial forms. The medicines ordered by the physician consist of D. prepared by the apothecary or chemist, and made up according to the prescription (q.v.). The business of the druggist is now to a considerable extent separated from that of the medical practitioner, with which it was formerly associated. See CHEMISTS AND DRUGGISTS, and APOTHECARIES.

DRU'IDISM. This institution was, perhaps, common to all Celtic nations, but we have detailed accounts only of the form under which it existed in Gaul. Cæsar gives the following description of the character and functions of the Druids: "They attend to divine worship, perform public and private sacrifices, and expound matters of religion. A great number of youths are gathered round them for the sake of education, and they enjoy the highest honor in that nation; for nearly all public and private quarrels come under their jurisdiction; and when any crime has been committed, when a murder has been perpetrated, when a controversy arises about a legacy, or about landmarks, they are the judges too. They fix rewards and punishments; and should any one, whether a private individual or a public man, disobey their decrees, then they exclude him from the sacrifices. This is with them the severest punishment. The persons who are thus laid under interdict are regarded as impious and wicked people; everybody recoils from them, and shuns their society and conversation, lest he should be injured by associating with them. They cannot obtain legal redress when they ask for it, nor are they admitted to any honorable office. All these Druids have one chief, who enjoys the highest authority amongst them. When he dies, he is succeeded by the member of the order who is most prominent amongst the others, if there be any such single individuals; if, however, there are several men equally distinguished, the successor is elected by the Druids. Sometimes they even go to war about this supremacy. At a certain time of the year, the Druids assemble on the territory of the Carnutes, which is believed to be the center of all Gaul, in a sacred place. To that spot are gathered from everywhere all persons that have quarrels, and they abide by their judgments and decrees. It is believed that this institution was invented in Britannia, and thence transplanted into Gaul. Even nowadays, those who wish to become more intimately acquainted with the institution, generally go to Britannia for instruction's sake.

"The Druids take no part in warfare; nor do they pay taxes like the rest of the people; they are exempt from military service, and from all public burdens. Attracted by such rewards, many come to be instructed by their own choice, while others are sent by their parents. They are reported to learn in the school a great number of verses, so that some remain there twenty years. They think it an unhallowed thing to commit their lore to writing, though in the other public and private affairs of life they frequently make use of the Greek alphabet. . . . Beyond all things, they are desirous to inspire a belief that men's souls do not perish, but transmigrate after death from one individual to another; and they hold that people are thereby most strongly urged to bravery, as the fear of death is thus destroyed. Besides, they hold a great many discourses about the stars and their motion, about the size of the world and of various countries, about the nature of things, about the power and might of the immortal gods; and they instruct the youths in these subjects."

It is easy to comprehend that this powerful priesthood did all they could to uphold the national cause against the Roman conquerors, and urged the people to rebellion; so much so, that the emperor Claudius found it necessary to interdict formally the prac-

ticing of Druidical rites, which seem, however, to have continued down to the extinction of paganism. Besides being priests and teachers of religion, the Druids appear also to have been adepts in the magic arts, and were versed in the mysterious powers of animals and plants. The oak-tree was especially sacred among the Druids. In oak-groves, they frequently performed their rites, and they even derived their name from this custom. See the article CELTS. They also had a special reverence for the mistletoe, when growing on an oak. According to Pliny, a Druid, clothed in white, mounted the tree, and with a knife of gold, cut the mistletoe, which was received by another, standing on the ground, in his white robe. The same author gives a curious account of the "serpent's egg," worn as a distinguishing badge by the Druids. It was formed, he says, by the poisonous spittle of a great many serpents twined together. Gathered at moonlight, and afterwards worn in the bosom, it was a mighty talisman. All these particulars refer properly to the Druids of Gaul, but Cæsar's testimony leaves no doubt that the Druidism of Britain was essentially the same.

In all the countries anciently inhabited by Celts, there are found rude structures of stone, one of the most common forms of which is the so-called *dolmen* (see that article). The older archæologists assumed that these were Druidical altars, but there is no proof that such was their destination or origin: similar structures are found in Scandinavia and many parts of Germany, and to assume in all these countries the presence of Celts, seems too hazardous. The same doubts prevail as to the larger monuments of this kind —the supposed Druidical temples of Amesbury, of Carnac in Brittany, and of Stonehenge (see that article).

DRUIDS, ORDERS OF, various social and benevolent organizations on the masonic plan, widely distributed in England, Australia, and the United States. The first order was formed in London, 1781; the first lodge in New York was organized 1833. In this country, 5 degrees have been added to the entrance degree; degrees have been instituted in England also. There are probably 125,000 members in all the world, of which more than 50,000 are in England, and perhaps 20,000 in the United States. In this country there were, 1870, about 150 "groves," of which number about two thirds were mainly of German membership.

DRUM (*druim*), a Celtic word meaning the back, and applied to a ridge of hills, enters into the composition of many names of places, especially in Ireland, as Drumcondra, Drumglass, Drumsheugh.

DRUM (Gr. *trommel;* Fr. *tambour*—a modification of *tabour; timbrel* and *tambourine* are other forms of the word *tabour* or *tambour*), a hollow cylinder of wood or metal, having skin (parchment) stretched across one or both ends, upon which the drummer beats with an instrument of wood or metal called a *drumstick*. The drum is used as an instrument of music along with other instruments in bands, and particularly for military purposes. The military drum serves for giving various signals as well as for music. There are three kinds of drum—the *side* drum, the big or *base* drum, and the *kettle* drum. Since 1858, the British infantry are supplied with brass side drums, 3 lbs. lighter than those formerly in use, and tuned with screws instead of straps and ropes. The cavalry drum is a copper or brass hemisphere, thus resembling a *kettle*, with a parchment lid. The big drum has both ends covered with parchment. The ancient Romans used small hand-drums—some resembling tambourines, others kettle-drums—in their religious dances; and the Parthians are said to have used them in war to give signals. They are believed to have been first brought into western Europe by the crusaders.

DRUM, a name given to a fashionable and crowded evening-party about the middle of the 18th c., at which card-playing appears to have been the chief attraction. The names drum, rout, and hurricane, by which these gay assemblies were known, sufficiently indicate their noisy, promiscuous, and irrational character. Lady Mary Wortley Montagu, writing from Louvère to her daughter in 1753, hints that ladies gave these entertainments to make money at cards to support their extravagance; and adds: "I find I should be as solitary in London as I am here, it being impossible to live in a *drum*, which, I think, so far from a cure of uneasiness, that it is, in my opinion, adding one more to the heap." See ROUT.

DRUM, SACRED, an object of religious veneration and instrument of magical incantation among the Laplanders in former times. It was hollowed out of a piece of the trunk of a pine or birch, in which certain peculiarities were required, and was covered with skin on the upper side only, the wood being partly left on the under side to serve as a handle. Figures were painted in red on the skin; the drumstick was a reindeer's horn; and to the drum were appended a large copper ring and some smaller rings. The drum was considered a necessary part of the furniture of every family. The motions of the rings, when the drum was beaten, which might be done only by the head of the family, were supposed to afford indications concerning the results of disease and other future events. The beating of the drum was accompanied with songs, and the person by whom it was beaten often fell into a trance, during which revelations were supposed to be made to him. The sacred drum seems to have been somehow connected with the worship of the sun.

DRUM-FISH, *Pogonias chromis*, of the family SCIENIDÆ, a fish allied to the *sheep's-head*, and inhabiting the shores of the United States, from New York to Florida, in schools. They vary from 2 to 4 ft. in length, and 15 to 18 in. in breadth, weighing from 10 to 25 lbs. Sometimes they are larger, weighing as much as 80 lbs. Scales large, stout, oblique; teeth on the jaws in a band. Pharyngeals with large paved teeth. Tongue broad, short, smooth; branchial rays, seven; dorsal fin has 10 stout, flattened rays, capable of being concealed in a furrow. Second dorsal fin rises at the termination of the first; pectoral fins large and pointed; air-bladder large and thick coated; spleen very long; stomach thick and muscular, with strong muscular columns; vertebræ, 24; color, bronze to red, rather lighter beneath, with a blackish spot behind the pectoral. There are two varieties according to De Kay, one dark brown, the *black drum* of the fishermen, the other the *red drum*. They are coarse food, but the young are regarded as a delicacy. The fish of this genus are remarkable on account of the noise which they make under water, which resembles that of a distant drum, and there is a difference of opinion as to the cause. Cuvier thought it had some connection with the air-bladder; De Kay attributes it to the compressing together of the broad pharyngeal teeth, and so do most of the fishermen, but they also believe that the trituration of the shell-fish upon which they feed is the more immediate cause of the sound. They often afford good sport in the catching; the line is baited with soft clams or muscles, the shell being left on.

There is another species of drum-fish described and figured by De Kay, the *pogonias fasciatus*, much smaller, from 7 to 10 in. long, having four or five blackish vertical bands extending down the sides; the pectoral fins are a faint yellow, the others dark brown. This has been supposed to be the young of the *P. chromis*, but De Kay has seen them 6 in. long in Sept., having all the characteristics of the adult fish. Its teeth and jaws, as well as stomach, resemble those of the larger fish. It has various names, as *young drum*, *grunter*, and *young sheep's-head*.

DRUM-MA'JOR, as a component member of a regiment, was not much known in the English army till the time of Charles I. There was in earlier times an officer in the royal household called the *drum-major general*, without whose license no one except royal troops might use a drum; but this office fell into disuse. The drum-major, when regularly established, received orders from the major of the battalion concerning the necessary beats or signals, and communicated them to the drummers. The management of the big drum, and the teaching and control of the drummers generally, still devolve upon the drum-major. The "beats" at present adopted by the British infantry were composed by drum-major Potter of the Coldstream guards.

DRUMMER is a component member of every British regiment. His position is slightly superior to that of the private soldier, but still he is reckoned as one of the rank and file. Besides his ordinary duties (see BEAT OF DRUM), the drummer performs the *drumming out* when a soldier is discharged with ignominy. See DISCHARGE. To the drummers is also intrusted the repulsive duty of flogging, when that sentence is passed upon soldiers. A *drum-head court-martial* (not now much adopted) has no particular connection with the drummers, but is a hasty council or court-martial held in the field around the big drum.

DRUMMOND, a co. in the province of Quebec, Canada, intersected by St. Francis river; 600 sq.m.; pop, '71, 14,281.

DRUMMOND, Captain THOMAS, R.E., was born at Edinburgh in 1797, and during his professional training at Woolwich and Chatham displayed high mathematical and mechanical abilities, with much aptitude for the application of scientific principles to practical affairs. In 1820, he was engaged by col. Colby to assist in the trigonometrical survey of the United Kingdom. The incandescence of lime having been brought under his notice at a lecture on chemistry, the idea occurred to him that it might be advantageously used on the survey to render distant objects visible: he accordingly made experiments, which, with their results, and the first application of the Drummond light (q.v.) in Ireland, are described by him in the *Philosophical Transactions* for 1826. A heliostat (q.v.) of his invention, described in the same paper, has ever since been employed with success in the survey. Experiments which he made with the view of adapting his "*Light*" to light-houses, are detailed in the *Philosophical Transactions* for 1830. When exhibited at Purfleet, it was powerful enough to cast shadows at Blackwall, distant 10 miles. Practical difficulties, not yet overcome, prevented the fulfillment of his hopes in this direction; his attention having been diverted to political life, for which he soon proved himself to be eminently fit. As the head of a commission appointed by lord Grey's government to superintend the fixing of the boundaries of the boroughs under the provisions of the reform bill, he performed most ably that laborious and important work. He next acted as private secretary to lord Althorp, chancellor of the exchequer; and finally, in 1835, went to Dublin with lord Mulgrave, as under-secretary for Ireland. Here the knowledge of Irish character and feelings which he had acquired in the survey was of great advantage to him, and by his impartiality, sound judgment, conciliatory disposition, indefatigable energy, and hearty devotion to the work before him, he at once gained the confidence and affection of the people. It was in a letter written by him to the magistrates of Tipperary on the 22d of May, 1838, that the memorable words

occurred—"Property has its duties as well as its rights;" an aphorism which instantly flew over Ireland, and continues everywhere to exercise a wholesome influence. But it was perhaps as the head of a commission appointed in 1836 to report on a railway system for Ireland, that D. rendered that country his greatest service by the admirable report which he had the main labor of producing. So far as the routes recommended have been followed, the expectations of the commissioners have been fulfilled or exceeded; and it is the opinion of good judges that it would have been well for Ireland had the carefully digested scheme been more fully adopted. By these multiplied labors, however, D.'s strength was overtasked, and he sank on the 15th of April, 1840, amidst the grief of the Irish people, and of his intimates in public life, who had hoped to see him rise to some of the highest offices in the state. A statue by Hogan was erected to his memory by public subscription, in the royal exchange at Dublin; and a memoir of his professional life (abridged in Knight's *English Cyclopædia of Biography*, ii. 647) was published in 1841 by capt. Larcom, R.E., in the 4th volume of *Papers on Subjects Connected with the Duties of the Corps of Royal Engineers.*

DRUMMOND, WILLIAM, OF HAWTHORNDEN, a poet of considerable celebrity, was descended from a very ancient and noble Scottish family, and was b. 13th Dec., 1585. He was educated at the high school of Edinburgh, and afterwards at the university of that city, where he took his degree of M.A., July 27, 1605. On leaving college, he was sent to the continent in order to study law, for which he exhibited great aptitude. He returned in 1609, and his father dying in the following year, he retired to the paternal estate at Hawthornden, which, according to the learned Ruddiman, "was a sweet and solitary seat, and very fit and proper for the muses;" and there, with an interval of 8 years of foreign travel, spent his life in his favorite literary pursuits. He died 4th Dec., 1649; his death, it is said, being hastened by his excessive grief for the fate of Charles I. His principal works are the following: *Tears on the Death of Moeliades*—prince Henry, son of James I.—(Edin. 1613); *Poems: Amorous, Funerall, Divine, Pastorall, in Sonnets, Songs, Sextains, Madrigals* (1616); *Forth Feasting* (1617); *Polemo Middinia* (Oxford, 1691). After relinquishing poetry, he wrote a sectional history of Scotland, known as the *History of the Five Jameses.* A standard edition of his poems was edited for the Maitland club by Dr. Irving and lord Dundrennan in 1832. Smaller editions appeared in 1833 and 1856, and an exhaustive life, with an account of his writings, by prof. Masson, in 1873. D. enjoyed the friendship of many of his literary contemporaries, including Drayton and "rare" Ben Jonson, the latter of whom visited him at Hawthornden in 1619. D.'s *Notes of Ben Jonson's Conversations with William Drummond of Hawthornden,* is a characteristic record of the literary spirit of the time.

D.'s verse abounds in the conceits, antitheses, and hyperboles of the period, and gives indication of a mind indulging itself in melancholy. His sonnets are the best specimens of his muse, although even in them one looks in vain for sustained harmony or great originality of thought.

DRUMMOND, Sir WILLIAM, 1760–1828; an English diplomatist, author of a *Review of the Government of Sparta and Athens; Origines, or Remarks on the Origin of Several Empires, States, and Cities,* etc. In 1796 and 1801, he was a member of parliament, and was made diplomatic representative in Naples and Constantinople. In *The Œdipus Judaicus* he undertook to explain some of the Old Testament narratives as being astronomical allegories, for which he was very sharply censured.

DRUMMOND ISLAND, within the limits of Canada, is in lake Huron, being the most westerly of the Manitoulin chain. It measures 20 m. by 10, and lies about 30 m. to the e. of Mackinaw, an island in the strait of the same name, which pours lake Michigan into lake Huron.

DRUMMOND LIGHT, or LIME-BALL LIGHT. The heat given out during the combustion of a mixture of hydrogen and oxygen gases, or of coal-gas and oxygen, is very intense; and when the mixture is directed on an infusible substance such as lime, a most brilliant light is evolved. Capt. Drummond, R.E., originally proposed the employment of this light in the trigonometrical survey of Great Britain, and constructed apparatus for its production. See DRUMMOND, THOMAS. In the most convenient form of the apparatus the mixed gases escaping by a jet, being set fire to and made to impinge upon a cylinder of lime, raise the surface of the latter nearest the jet to a white heat, accompanied by a dazzling light. As minute portions of lime become detached and are volatilized from the spot on the lime on which the jet of burning gases strikes, it is necessary to expose a new surface of lime to the gases, and for this purpose a screw may be turned by the hand or by clockwork. The hydrogen and oxygen ought to be confined in separate gas-holders or bags, and to be brought by different tubes, provided with separate stop-cocks, to within a short distance of the exit jet. The common tube through which the mingled gases pass to the jet is about 6 in. long by two thirds of an inch in diameter; and in Mr. Hemming's construction the tube is very closely packed, full of very fine brass wire, which is afterwards wedged in by a stout wire being driven down the center. The object of the fine wires is to prevent the return of the flame, which might lead to a disastrous explosion. When the rays from this light are concentrated by a parabolic reflector, it can be seen at immense distances. Thus, on the 31st Dec., 1845, at half-past 3 P.M. (daylight), the light was exhibited on the top of Slieve

Donard, in county Down, and was seen from the top of Snowdon, a distance of 108 m.: and in other instances the D. L. has been seen at distances up to 112 miles. The employment of coal-gas instead of hydrogen has greatly increased the applications of the D. L., and it is now often used in magic-lanterns and other apparatus where great brilliancy and penetration of light are required. It has been used lately on the continent with great effect in illuminations. Great caution should at all times be exercised in the preparation, storing, and employment of the gases, as many dangerous explosions have occurred. Little heat is evolved from the D. L., nor does it vitiate the surrounding air, or consume its oxygen.

DRUNKENNESS. See INTOXICATION, and also TEMPERANCE.

DRUPA'CEÆ, a species of plants, placed by many as a sub-order of *rosaceæ*, having a one-celled, one-seeded indehiscent fruit, consisting of a fleshy, succulent exterior, and hard stone in center containing seed, such as the peach, plum, and cherry.

DRUPE, in botany, a succulent fruit containing a single seed or kernel, usually inclosed in a hard "stone," the *endocarp*. The succulent part is the *mesocarp*. Examples are familiar in the fruits generally known as stone-fruits, the peach, plum, cherry, etc. In the almond, the mesocarp is not succulent, yet the fruit otherwise possessing all the characters of a D., receives that name. It may be regarded as intermediate between a D. and a nut. The fruits of the genus *rubus* (raspberry, bramble) are composed of many small aggregated drupes, upon a common receptacle. The date is a D. in which the hard "stone" is represented by a membrane.

DRURY, DRU, a goldsmith, silversmith, and cutler, in London, where he was b., 4th Feb., 1725, was devoted to the study of entomology and the collection of exotic insects His *Illustrations of Exotic Entomology* (2 vols., Lond. 1773–82), a work unrivaled at the time of its publication for the accuracy and beauty of its figures, is still in high repute as a book of reference. D. was also assiduous in his endeavors to acquire information concerning the habits of insects. He died 15th Jan., 1804.

DRUSES, a remarkable people who inhabit a district in the n. of Syria, comprising the whole of the southern range of Mt. Lebanon and the western slope of Anti-Lebanon. In this district they hold exclusive possession of about 40 towns and villages, and divide the possession of about 200 more with the Maronites (q.v.), while 80 villages in other parts of Anti-Lebanon are peopled by them. The inhabitants of the Lebanon afford a remarkable illustration of the amalgamation of races. After the second captivity of Israel, Esarhaddon repeopled the wasted strongholds of Samaria with certain fierce tribes, some of whom, called in the Scriptures Cuthites, and known in subsequent times to the Greeks as Carduchi, and familiar to us as Kurds, settled in Lebanon. From them the present D. are supposed to have originally sprung. More than a thousand years later, a fresh colonization took place. The Mardi, a warlike tribe who dwelt to the n. of the Caspian, originally of Persian extraction, were transplanted thither by Constantine IV., in 686 A.D., to the number of 12,000, to act as a bulwark against Mohammedan invasion. The Arabs also, in sweeping through the mountain fastnesses, left a permanent impression there. Thus, Cuthites, Mardi, and Arabs, or rather Mohammedans of various races, have combined to form that strange being—the modern Druse. It has also been supposed by some that there runs in his veins not a little of the blood of the crusaders, but this is doubtful. No immigrations, however, of any importance into the country of the D. took place after the close of the 10th c.; and this period seems naturally to conclude the first great section of Druse history.

The nationality of these mountaineers having now been consolidated, their peculiar and mysterious religion began gradually to be developed. Hakem Biamr Allah, or Bemrillah, caliph of Egypt, and a Nero in cruelty, was the author of this system. He affirmed that he was the representative of God, and, having enlisted his confessor, Darazi, in his cause, he prepared to propound his doctrine. In the 407th year of the hegira (1029 A.D.), the divine nature of Hakem, or rather the incarnation of the spirit of God in him, was publicly announced at Cairo. This revelation, however, was unfavorably received by the mob. Hakem's confessor, Darazi, narrowly escaped the fate of a martyr to the impostures of his master. Retiring, however, to the fastnesses of the Lebanon, he there began to inculcate the principal of the new faith; and although he never acquired any mastery over the sympathies of the mountaineers, he at least left his name to them; for there can be little doubt that the name Druses is derived from that of Darazi. Hamzé, a Persian mystic, and successively the disciple and vizier of Hakem, introduced into the newly promulgated religion all the elements of attraction and strength which it possesses; and him the D. venerate as the actual founder of their faith.

The D. form one of the very few sects among whom proselytism is discouraged. They are remarkable conservatists. For 800 years they have maintained a distinct religious and political independence and nationality. Into their faith the doctrines of the Pentateuch, the Christian gospel, the Koran, and the Sufi allegories, are wonderfully interwoven. They reject, however, the seven points of Islamism, substituting for them the following seven:—1. Veracity (to each other only); 2. Mutual protection and resistance; 3. Renunciation of all other religions; 4. Profession of the unity of Hakem

as God; 5. Contentment with his works; 6. Submission to his will; 7. Separation from those in error, and from demons. They believe in one God in whom there are no parts, to whom they ascribe no attributes, before whom the tongue ceases to utter, the eyes to behold, but who has revealed himself ten times upon the earth under the form and name of mortal men. In Hakem, so Hamzé taught, had God revealed himself for the tenth and last time. They also believe that the number of existing souls never varies, and that all the souls in life now, have lived, vested in some human form, from the beginning of the world, and will so continue to exist till the end of it; that when a man dies, his soul puts on a fresh humanity, which occupies a rank in moral dignity corresponding to the purity or impurity of the past life. But although they believe, in this sense, in the transmigration of souls, they also believe that after the lapse of ages, when the soul will have been purified from every stain, there will come a period of rest. As a religious body, the D. are divided into two classes: the Akals, or those initiated into the Druse mysteries; and the Djahils, the uninitiated. The former do not adorn themselves with gold, or wear silk, embroidered, or fanciful garments; they forbear using wine, spirits, tobacco, and other luxuries, never swear, utter obscene language, or lie. The latter are free from all religious duties. But, however rigid the profession of the Akal or initiated Druse, he is taught that his practice may be conducted in some cases on the principle of expediency. To be truthful, he is taught, is desirable; but when concealment is necessary, then equivocation, or even falsehood may be practiced.

Previous to 1840, Druse and Maronite lived on terms of intimacy and friendship. At that period, however, dissension sprung up between the two tribes, and proved to be the introduction to years of intermittent warfare. The strife reached its climax in 1860. From May to Oct. of that year, accounts of the fearful barbarities practiced by the D. upon the Maronites followed each other with appalling frequency, until the indignation of Europe was roused against them. A conference of the five powers which had guaranteed the independence of Turkey met at Paris, and it was resolved that a French army should proceed to Syria to chastise the D., and that, at the same time, a European commission should, on the spot, make inquiry as to the facts. The troops reached Syria in Aug., 1860. They could not, however, get at the D., who retired into the desert of the Haouran. In the meanwhile, it was ascertained beyond all doubt that the Turks, and the low fanatical mob of Damascus (who have frequently been confounded with the D., because they fomented their passions), were mainly chargeable with the crimes that had been committed; and that the retaliation of the Maronites was equally vindictive and horrible. It is stated that the Maronite leaders—in most cases bishops—on being asked to furnish sworn lists of such of the D. as, from the unusual atrocity of their crimes, were worthy of death, sent in a list demanding 4,846 heads; refusing, however, to bring forward any particular charges. Punishment was inflicted on those who were really to blame. While the French troops remained in Syria, the Turks were compelled to punish the chief Mohammedan criminals, a considerable number of whom, including Achmet Pasha, the governor of Damascus, were shot. In June, 1861, the troops returned to France, and the commissioners drew up a new constitution for the Lebanon, finally revised and signed on 6th Sept., 1864. Under it, the Lebanon is to be ruled by a Christian governor, appointed by the porte; and to be divided into seven districts, under chiefs of the prevalent religion in each. The result was the appointment, as governor, of Daoud Pasha, an Armenian Christian, and of 7 chiefs (4 Maronite, 1 Druse, 1 orthodox Greek, and 1 separatist Greek). The constitution did not satisfy the Maronites, whose revolt, under Joseph Karam, kept the Lebanon in a very unsettled state till 1867. During this period, the governor had to restrain the D. from attacking the Maronite villages in the absence of their defenders. The D. are about 80,000 in number; they are a brave, handsome, and industrious people, and can almost all read and write. They had no superior educational establishment until Daoud Pasha founded and endowed one at Abey. Polygamy is unknown among them. They have, with incredible toil, carried the soil of the valleys up and along the hillsides, which are laid out in terraces, planted with mulberry, olive, and vine. Their chief trade is the manufacture of silk. Corn is also raised, though in very small quantity. Deir-el-Kammar is the principal town. See *Druses of the Lebanon*, by the earl of Carnarvon; Guy's *La Nation Druse.*

DRUSIUS, or VAN DEN DRIESCHE, JOHANNES, 1550–1616; a native of Flanders, an orientalist, and Protestant divine. He went to England when young, and became professor of oriental languages at Oxford. In 1576, he returned to his own country, and was given the same professorship in Leyden. He was subsequently professor of Hebrew in the university of Franeker, in Friesland, He had a son John who mastered Hebrew before he was nine years old.

DRUSUS, the name of a distinguished family of the gens Livia, which contributed a large proportion of eminent men to the Roman commonwealth. The most conspicuous of the Drusi were: 1. M. LIVIUS DRUSUS, tribune of the people in 122 B.C., who made it the business of his public life to thwart the democratic policy of his colleague, C. Gracchus, and uphold the cause of the senate and nobles, which he did with much skill and ultimate success. 2. His son, who bore the same name as himself, and whose

dangerous and daring political intrigues, conducted partly for the benefit of the aristocratic party whose sympathies he inherited, and not less for his own aggrandizement, kept Rome in perpetual turmoil and disorder from 100 B.C. till his death in 91 B.C. Though identified by birth and sympathy with the patricians, Drusus, to win the people, renewed some of the most liberal measures of the Gracchi, and carried agrarian and frumentarian laws. During the latter years of his life, he contrived to gather into his own hands the threads of the various political movements which resulted in the social war; but his almost incredible pride and arrogance had made him so many enemies, that his death, in the flower of his age, was regretted as little by his friends as by his foes. 3. The most illustrious of the Drusi was Nero Claudius Drusus, commonly called Drusus senior, the stepson of the emperor Augustus, and younger brother of the emperor Tiberius. He was born in 38 B.C., and as he grew up, developed splendid personal qualities as well as the highest capacity for civil and military affairs. He began his public career in 19 B.C., and signalized himself when only 23 years old by his defeat of the Rhæti and other Alpine tribes which infested the n. of Italy. In 13 B.C., he was sent into Gaul, then in revolt, and, after crushing the rebels there, pushed across the Rhine in pursuit of their German allies. In this campaign he subdued the Sicambri and Frisii, and forced his way to the German ocean, being the first Roman general who had done so. From this time he made the business of his life to establish the Roman supremacy in Germany, partly by conquest, and partly by the execution of great military works. Among these latter may be mentioned the canal joining the Rhine with the Yssel, the two bridges over the Rhine itself, and the embankments of the Vahalis, the Waal. In 11 B.C., he conquered the Usipetes, the Cherusci, and the Suevi; in the following year, the Chatti, the Nervii, and was prosecuting the work of subjugation in 9 B.C., when a fall from his horse cut short his brilliant career in his 30th year. For his exploits in Germany, D. was rewarded with the title of Germanicus, but care must be taken not to confound him with the celebrated Germanicus, his own son. See GERMANICUS.

DRUSUS CÆSAR, usually called Drusus junior, d. 23 A.D.; and son of Tiberius by his first wife. He was made quæstor in 10 A.D., consul in 15 A.D., but degraded the office by his excesses, and his father sent him with the army to Illyria. In 22 A.D., he was made *tribunicia potestas*, and looked upon as heir to the throne. Deeming Sejanus to be his rival, Drusus struck him in the face; whereupon Sejanus persuaded Livia, the wife of Drusus, whose affections Sejanus had beguiled, to poison him The death of Drusus was charged to intemperance, but eight years afterwards the crime was confessed.

DRY PILE, a voltaic battery without liquids, supplying a feeble electric current. A usual form is with disks of copper and zinc papers in pairs, back to back, and packed in glass tubes—all the copper surfaces in one direction.

DRY'ADS, an inferior order of deities in the mythology of Greece. Their name is derived from the Greek word for an oak-tree (*drus*). They were looked upon as the guardians of the larger kinds of forest trees, along with which they came into being, and with which they died.

DRYDEN, JOHN, was b. at Aldwinckle, in Northamptonshire, on the 9th Aug., 1631. His father, Erasmus Driden, was the third son of sir Erasmus Driden, created a baronet in 1619. D. received the rudiments of his education at Tichmarsh, and was afterwards admitted a king's scholar at Westminsters chool, under Dr. Busby. Here in 1649, he wrote an *Elegy on the Death of Lord Hastings*, and some commendatory verses on the *Divine Epigrams* of his friend John Hoddesdon; both of which performances were published in 1650. In May, 1650, he was elected to a schoralship in Trinity college, Cambridge; he took the degree of Bachelor of Arts in 1653–54; and was made Master of Arts in 1657. His father dying in 1654, put him in possession of an estate worth £60 per annum, of which sum his mother had life-interest in a third. After leaving the university, he proceeded to London, under the patronage of sir Gilbert Pickering, who was faithful to the protector, and seems to have aroused for the time the same feeling in his protégé, whose first poem of importance was entitled *Heroic Stanzas on the Death of Cromwell.* On the return of Charles II., D., with equal splendor of diction, and perhaps with equal sincerity, congratulated the restoration.

The publication of a poem, entitled *Astræa Redux*, led to a breach between the poet and the family of sir Gilbert Pickering, and he now became author by profession. He turned his attention to the stage, planned *The Duke of Guise*, and wrote his first acted play, *The Wild Gallant.* In Dec., 1663, he married a daughter of the first earl of Berkshire, with whom he received a portion; and in 1670, he was appointed poet-laureate and historiographer, with a salary of £200 a year. He afterwards entered into an engagement with the theaters to supply them with three plays each year, for which he was to receive annually from £300 to £400; but as he did not fulfill his share of the contract, it is not probable that the theaters fulfilled theirs. In 1671, the duke of Buckingham produced his attack on the English heroic drama, of which D. was the head. This satirical piece was entitled *The Rehearsal,* and when it was brought on the stage, the town was amused. Although personally satirized, D. endured his castigation in silence, and, waiting his opportunity, immortally revenged himself on the witty and profligate

duke in the *Absalom and Achitophel.* This magnificent satire arose out of the political commotions of the times, and is an elaborate defense of the king against the whig party. Charles II. is *David;* Monmouth, *Absalom;* Cromwell, *Saul;* Buckingham, *Zimri;* and Shaftesbury, *Achitophel.* Its success was amazing; it ran through five editions within the year. This great poem appeared in 1681; and enraged at its success, D.'s enemies hovered around him like a cloud of venomous gnats. In the same year he published *The Medal.* Elkanah Settle, one of the most virulent of his foes, replied with some effect; and D., thoroughly roused, issued next year the *Mac Flecknoe,* and the second part of *Absalom and Achitophel.* These satires were as overwhelming as the Italian battles of the first Napoleon; D.'s enemies were crushed forever, and he remained during his lifetime the undisputed king and lawgiver of English literature.

After the death of Charles II., D. became a convert to the Roman Catholic faith. This event was announced to the world by the publication of *The Hind and Panther,* in 1657. For this change of faith, he has been much abused. Macaulay calls him "an illustrious renegade." Mr. Bell, one of his biographers, strenuously defends his conscientiousness. At the revolution, he was deprived of his laureateship, and somewhat straitened in circumstances, he fell back upon his old occupation of writing for the stage. His translation of *Virgil* was begun in 1694, and completed by the close of 1696. A month after the publication of *Virgil,* appeared the *Ode on Alexander's Feast.* In 1698, he commenced his *Fables,* and completed them in a year and a half. His last work was a mask, with prologue and epilogue. He died on the 1st May, 1700, and was buried in Westminster abbey, where a monument was erected to his memory by John, duke of Buckingham.

Although the great bulk of D.'s works are composed of plays, and although these are, for the most part, devoid of character, feeble in sentiment, false to all external nature, and exaggerated in expression, he remains one of the prime glories of English literature. His *Satires* and his *Fables* are masterpieces. In these, he is almost always masculine and natural, and his versification flows on broad, deep, and majestic. Nor is it only as a poet that he excels; his prefaces and *Essays on Dramatic Poesy* prove him to be a master of "that other harmony of prose." His works in 18 vols. were edited by Scott.

DRYING-MACHINES. The ordinary process of drying clothes and fabrics by exposure in the open air, has been found too tedious for the bleacher, dyer, and for large laundry establishments; and hot-air chambers have been extensively used; but a great improvement has been lately made by using the principle of centrifugal force to throw off the greater part of the moisture. The drying-machine commonly used consists of two drums or cylinders open at the top, the inner one, into which the goods are packed, is perforated at its sides, and made to revolve with great velocity either by steam, water, or hand-power. The action of the drying-machine is precisely the same in principle as that witnessed when the housemaid is *trundling* a mop, or of the dog when he shakes himself on coming out of the water. The use of the outer cylinder is merely to catch the drops of water thrown out, and prevent the inconvenience that would result from its distribution through the apartment. A pipe connected with this outer drum carries the water away. The drying is not, however, quite completed by such machines; a very slight degree of moisture, just perceptible to the touch if the goods are pressed against the cheek, still remains. This is expelled by open-air or hot-chamber drying. These drying-machines are commonly called "extractors" by dyers. A simpler and cheaper drying-machine has been lately introduced for domestic use. It consists of two rollers mounted parallel, and one above the other, with an adjustment to vary the distances between them. One end of the article to be dried is inserted between the rollers, which are then brought as close as possible together, and one roller is turned by a handle, the other, being free to revolve, turns also as the clothes pass between them—the moisture in this case being extracted by pressure, as in the common process of "wringing."

DRYING OILS. See OILS.

DRYNESS, a technical term in painting, used to indicate a style in which the drawing is hard, angular, and formal, and the color deficient in harmony and mellowness, though not necessarily in power or richness. The earlier works, both of the Italian and Flemish schools, all more or less partake of this defect; and it is the most prominent characteristic of those of their imitators to whom the name of pre-Raphaelites has been given.

DRYOBA'LANOPS. See CAMPHOR.

DRY'OPHIS, a genus of serpents of the family *colubridæ,* allied to *dendrophis,* and, like those of that genus, of very elongated form, and living mostly among the branches of trees, but distinguished by a projecting muzzle—a curious prolongation of the upper jaw, which in some is slender, in some leaf-like. They are natives of the East Indies, Madagascar, and tropical America.

DRY-POINT, a sharp etching-needle, used to incise fine lines in copper, without the plate being covered with etching-ground, or the lines bit in by acid. See ENGRAVING.

The work produced by the dry-point is not only very delicate, but it wears less in printing than lines produced by the action of acid. Fairholt's *Dictionary of Art Terms.*

DRY PROCESS, in photography. Reference to the article COLLODIONIZED PAPER PROCESS will show that the collodionized glass-plate, on being withdrawn from the bath, previous to, and during exposure in the camera, has mechanically adhering to its surface a quantity of solution of free nitrate of silver, and it is partly upon the presence of this salt that the extreme sensitiveness of wet collodion plates depends. This, however, is not the sole cause of sensibility to actinic rays; carefully conducted experiments fairly lead to the assumption, that the molecular arrangement of the ultimate particles of iodide of silver, and of the pyroxyline, forming, as it were, the network of the film while wet, materially affect this necessary condition; and it is the object of what is termed a *dry process* to preserve this molecular arrangement as far as possible unaltered, notwithstanding the disturbing influence which would necessarily be exerted by the desiccation of the film. This desirable end for traveling photographers is accomplished with more or less certainty by the employment of solutions of various substances, which are poured over the film after the adhering nitrate of silver has been removed by copious washing with water. The heterogeneous character of the substances so used goes far to prove that their action is principally *mechanical*, they being selected from the animal, vegetable, and mineral kingdoms. Among the first may be mentioned honey, gelatine, glycerine, milk, and albumen; among the second, syrups, gum, wine, beer, balsams, and resins added to the collodion, and linseed tea; and among the third, chloride of calcium, nitrate of zinc, and nitrate of magesia. The plate, on its removal from the sensitizing bath, being well washed with water, any one of these substances is dissolved in water in suitable proportion, and applied to the surface of the plate by pouring on and off several times. It is then set up to drain and dry on folds of bibulous paper in a dark closet or box. The plate is then ready for use. The pictures obtained on plates so prepared do not suffer by comparison with those taken by the wet collodion process; the only drawback to their use being a slight diminution in the degree of sensibility to light.

DRY ROT, a kind of decay, often very rapid, to which timber is subject, without the presence of much moisture. It has proved ruinous to many valuable edifices, and has been the cause of many serious accidents. The ends of joists are often affected by it, so that upon being burdened with even a slight additional load, they are ready to break off by the wall; and the process of destruction has often gone far without a suspicion being entertained of anything wrong. Dry rot is occasioned by *fungi*, the *mycelium* of which diffuses itself through the substance of the timber, destroying its texture, and reducing it to a fragile or even friable mass. *Merulius lacrymans*, *M. vastator*, and *polyporus destructor* (see AMADOU), are species very commonly productive of this mischief; the first being the most common and formidable dry-rot fungus in Britain, and the last having the same pre-eminence in Germany. Its German name is *hausschwamm*. Other fungi, however, produce the same effects where none of these are present; but besides the species which are well ascertained, there are some forms of mycelium not unfrequently occurring as dry rot, of which it is uncertain to what fungus they ought to be referred, as they have not been observed to develop themselves in any perfect form, whilst also it is not known what different modifications of appearance the mycelium of the same fungus may exhibit in different circumstances. Very destructive ravages have been ascribed to different species of *sporotrichum*, particularly in the naval yards of Britain; but the genus is altogether a doubtful one, and not improbably consists of mere forms of undeveloped mycelium. Several species of fungi are often present together in timber affected with dry rot. Some of them penetrate deeply into the substance of the timber, others spread more superficially, but attract moisture from the atmosphere, which hastens decay. This is the case with *merulius lacrymans*, which first appears in small white points; a filamentous substance, radiating from these, gradually forms broad patches, sometimes many feet in diameter; from these, long creeping shoots often proceed, and a net-work of filaments penetrates into every crevice. The species of *polyporus* more generally fill the whole mass of the timber with delicate filaments, which destroy the cohesion of its fibers. *Dædalea quercina* appears in the form of leathery laminæ, often in the strongest oak, and the delicate threads of mycelium penetrate every duct and cavity, reducing the whole to a fungous mass. Beautiful orange tufts sometimes appear, supposed to be the mycelium of species of *coprinus*.

Of the causes of dry rot, stagnation of air, as behind a wainscot or under a floor, is certainly one of the chief, and a knowledge of it suggests means of prevention which may often be easily and most advantageously employed. Another principal cause is insufficient drying of the timber itself; and much of the prevalence of dry rot is not improbably due to the practice of felling oak in spring for the sake of the bark, when the wood is full of sap. Any circumstance which may tend to render the sap acidulous, greatly increases the liability to dry rot. The production of fungi takes place with unusual rapidity when by fermentation or otherwise an acidulous condition of organic substances is produced. A fermentation and chemical change in the albuminous constituents of the wood, is not improbably the immediate cause of dry rot, providing a soil suitable for the vegetation of fungi.

For the prevention of dry-rot, various processes have recently begun to be employed, the object of which is to fill the pores of the wood with some chemical substance, sir William Burnett used chloride of zinc; Mr. Bethell used creosote; and Mr. Payne, lime, with silicate of potash. The process most generally approved, and apparently most successful, is that of Kyan, called *Kyanizing* (q.v.), in which a solution of corrosive sublimate is introduced into the pores and cells of the timber by means of an air-pump. The salts of mercury have been found to be more unfavorable to the development of fungi than any other chemical substances.—But without the use of any such means, we have abundant evidence that well-seasoned timber, in favorable circumstances, may remain unassailed by fungi for many centuries. England contains structures of which the timber is known to be nearly 1000 years old; wood in a state of perfect preservation was brought by lord Elgin from behind the frieze of the Parthenon, where it must have been placed more than 2,000 years ago; and the British museum contains a block of charred wood found by Mr. Layard in his excavations at Nineveh.

DRY STOVE, in gardening, a hot-house in which the air is kept less moist than in the bark stove. In structure and in management, except that the temperature is kept higher, it agrees more nearly with the green-house. The dry stove is particularly adapted to succulent plants. As free an admission of air is allowed in the dry stove as is consistent with the maintenance of the temperature.

DRY TORTUGAS, the extreme south-western islets of the Florida Keys in the gulf of Mexico; 120 m. w.s.w. of the s. extremity of the mainland. They are of coral formation, low, and generally barren, though some are covered with mangrove bushes. Fort Jefferson, on one of them, was a penal station during the war of the rebellion. On the same island is a lighthouse. Pop. '70, 237.

DUAL, in grammar, is the form given in some languages to a noun or a verb, when only two things are spoken of. Thus, in Greek, *pater* is father; *patere*, two fathers; *pateres*, fathers. To have a dual number in addition to a plural is often spoken of as a refinement of language. It argues, however, a higher degree of abstraction to be able to conceive every subject as one, or more than one, than to require three classes—one, a pair, and more. Accordingly, it is only in some of the more ancient languages that we find traces of a dual number, and it becomes lost as the power grows of analyzing concrete impressions. Sanscrit, ancient Greek, Arabic, and Hebrew, have the dual number, the last only in nouns. Modern Greek has lost the dual. The only trace of it in Latin is in the two words *duo*, two, and *ambo*, both. It is wanting in the Germanic languages, with the exception of the ancient Gothic, which had a dual form of the verb. In Anglo-Saxon, there was a separate form of pronoun for "we two" (*wit*) and "ye two" (*git*).

DU'ALIN, an explosive preparation of nitro-glycerine and sawdust, intended to diminish the danger in the transportation and storage of nitro-glycerine.

DUALISM is the name given to a philosophical theory, according to which some two principles, of different nature, original, and incapable of being derived the one from the other, lie at the bottom of everything; as, for example, the ideal and the real, or the material and the thinking substance. In a narrower and theological sense, dualism means the assumption of two original beings, a good and an evil, as in the doctrine of Zoroaster, or of two distinct principles in man, a bodily and a spiritual. The opposite of dualism is monism.

DUANE, JAMES, 1733–97; b. N. Y.; a lawyer and a leader in the revolutionary war. He was a member of congress, 1774–77 and 1780–82; was the first mayor of New York after the revolution, and late in life was U. S. district judge.

DUANE, WILLIAM, 1760–1835; b. N. Y.; politician and journalist. He began journalism in India about 1784, but was sent back to England because of criticisms on the government, and his large fortune was confiscated. In London, he was for a time editor of the *General Advertiser*. In 1795, he came to Philadelphia and took the editorial chair of *The Aurora*, the organ of the Jeffersonian democracy, making it one of the most vigorously abusive journals in an abusive age. On one occasion he was mobbed and savagely beaten by a party of federalists. In 1822, he left the editorial chair and traveled in South America, and on return published an account of his wanderings. He served in the war of 1812. He wrote several works on military subjects.

DU BARRY, MARIE JEANNE GOMARD DE VAUBERNIER, Comtesse, favorite of Louis XV., was b. Aug. 19, 1746, at Vaucouleurs. Her mother was a dressmaker, and her father, or rather her reputed father, was an exciseman named Vaubernier. After the death of her father, she stayed for some time at a convent, but left it when fifteen years of age; went to Paris, and assuming the name of Mademoiselle Lange, succeeded in obtaining employment in the establishment of a fashionable milliner; but in a short time renounced all honest occupation, and forming a connection with a disreputable house, met there the comte Jean Du Barry, one of the most noted *roués* of his day, who made her his mistress. This person afterwards introduced her to Lebel, valet-de-chambre of Louis XV., who presented her to his royal master, then nearly 60 years of age. She was at this time remarkably handsome, to some extent witty, and had a frankness, or it might be, a vulgarity of manner that amused the doting monarch.

Desirous that *la petite Lange* should obtain a title, and be introduced to court, Louis prevailed upon comte Guillaume Du Barry, brother of the comte already mentioned, to marry, and thereby confer his title upon, the favorite. Accordingly, in 1769, she was presented to court as the comtesse Du Barry. After this period, many of the most powerful courtiers abased themselves before her. D'Aiguillon became her confidant, and in concert with her, ruled the doting king; the chancellor Maupeou claimed a remote relationship with her, and by her influence succeeded in dismissing and exiling the parliament in 1771; the abbé Terray, comptroller-general of finance, was *suave* to her, though insolent to all the rest of France. At no period, perhaps, was the court of France more openly and outrageously immoral than during the supremacy of this strumpet. On the death of Louis, however, in 1774, Du B. was dismissed from court, and sent to live in a convent near Meaux. She was afterwards removed to her residence of Luciennes, and while living there was allowed a pension by Louis XVI. Some time after the outbreak of the revolution, she went to London to dispose of her jewels. On her return, Robespierre caused her to be arrested, July, 1793. In Nov., she was tried before the revolutionary tribunal, and accused of "having wasted the treasures of the state, of conspiracy against the republic, and of having, in London, worn mourning for the late king." She was condemned to death, and was sent to the guillotine 7th Dec., 1793. Of all the women who mounted the scaffold during the revolution, Du B. exhibited the least courage. She implored the "good people" to deliver her, and Monsieur the executioner to prolong her miserable life for one moment only. The single good thing that history records of her, is her patronage of various artists and men of letters, but there is little reason to believe that it originated in anything higher than her dread of epigram and caricature. She had neither taste nor knowledge, and cared only for sensual gratifications and excitement. It is estimated that she cost France 35,000,000 francs. The *Mémoirs* published under her name (6 vols., Par. 1829–30) are not reliable. The only work, it seems, which can be consulted with confidence is Lacretelle's *Histoire de France pendant le* 18me *Siècle.*

DUBIT'ZA, a fortified t. of European Turkey, is situated on the northern frontier of Bosnia, on the right bank of the Unna, and at a point about 10 m. from its confluence with the Save, of which it is a tributary. During the 16th and 17th c., it was a bone of contention between Austria and the Porte, and was repeatedly lost and regained by the latter. It is chiefly notable, however, for its heroic but unavailing resistance to the Austrians in 1788. D. was subsequently restored to the Turks, to whom it now belongs. Pop. 6,000.—Over against Turkish D., on the opposite bank of the Unna, stands Austrian Dubitza, a strongly fortified market town in Austrian Croatia.

DUBLIN, a maritime co. in the e. of Leinster province, Ireland, and containing the metropolis of that country; bounded, n., by Meath; e., by the Irish sea; s., by Wicklow; and w., by Kildare and Meath. It is the smallest but two of the Irish counties, being 32 m. long, and 18 (average 12) broad; area, 354 sq.m., of which $\frac{8}{9}$ths are arable, and $\frac{1}{40}$th in wood. The coast, from its indentations with creeks and bays, is 70 m. long, and off it lie several isles. Dublin bay, one of the finest in the kingdom, is 6 m. broad, 6 deep, with a sweep of 16 miles. It has two precipitous hills, about 500 ft. high at its n. and s. ends; but the head of the bay is low and sandy. The coast is defended by 26 martello towers. The surface is mostly a level rich plain, with slight undulations, but rising in the s. in a hill-range, the highest point of which is Kippure, 2,473 feet. N. of this range, the only prominent eminences are Lambay isle, or Ireland's Eye, and Howth Head, 503 feet. The only river of note is the Liffey, which runs through Dublin city into Dublin bay. The Royal and Grand canals run w. through the co., and unite the Liffey and the Shannon. The chief rocks are carboniferous limestone, granite, and some metamorphic rocks and greenstone. There are copper and lead mines near Scalp. Fuller's-earth and potter's-clay occur. Iron and manganese are found on Howth peninsula. Granite and limestone are much used in building. There are many mineral springs, including 10 saline purgative ones, within the city of Dublin, and some tepid ones of 75° F. The climate is mild. The soil is generally a shallow calcareous gravelly clay. In the n. and w. are grazing and meadow farms, and around Dublin city, villas, kitchen-gardens, dairies, and nurseries. D. is the best cultivated co. in Ireland. In 1876, 90,283 acres, not very much under half the co., were in crop. The chief crops are oats (in 1876, 16,109 acres), wheat (5,646 acres), potatoes (9,863 acres). There are important fisheries along the coast of turbot, brill, sole, plaice, cod, ling, haddock, whiting, and oysters. The manufactures (chiefly of cottons, stockings, and embroidered muslins) are mostly confined to the city and the vicinity of the metropolis, and are of more value than in any other Irish county. Balbriggan is famed for its hosiery. The chief exports are from Dublin city. D. is divided into 9 baronies, and contains 76 civil parishes, and 10 parts of parishes. The chief towns are Dublin, the capital of Ireland, and Kingston. Pop. '71, exclusive of Dublin city, 160,000; including the city, 408,366. At the end of 1877, the co. had 53,232 pupils on the rolls of its national schools. The co. sends six members to parliament—two for D. co., two for Dublin city, and two for Dublin university. The manners, appearance, dress, and cabins of the lower orders in D. co. differ less from those of the interior of Ireland than would be expected. There are numerous antiquities in different parts of the county.

DUBLIN (Irish, *Dubh-linn*, "black pool;" the *Eblana* of Ptolemy), the capital of Ireland, stands on the river Liffey, where it disembogues into Dublin bay, in lat. 53° 20′ 38″ n., and long. 6° 17′ 30″ west. It covers an area of 1300 acres, but its parliamentary boundary comprises an area of about 5,000 acres, and its municipal boundary nearly 4,000 acres. Much of D. is built on land reclaimed from the sea, a work which still continues; and the ground is generally flat, with a very few undulations, scarce deserving the name of hill. The river, running from w. to e., divides the city into two almost equal portions. The aristocratic parts are the s.e. and n.e., containing many beautiful squares, with splendid streets and terraces. The center, and the n.w. quarter are the great emporiums of trade, and the residence of the middle classes, many of whom, however, have their private houses in the suburbs. The s.w. division, part of which is called the "Liberties," once the seat of the silk trade, is the most filthy and degraded portion of the city. The streets in this quarter are narrow, crooked, and irregular, while in the fashionable portions they possess a totally opposite character. The city is surrounded by a "circular road" of nearly 9 m. in length, forming a favorite drive and promenade.

In the newer parts of D., the streets run at right angles to one another, and are remarkable for their breadth and the uniformity of their architecture, which, however, is so varied as to avoid monotony. The most imposing one is Sackville street, which is 120 ft. broad, and nearly 700 yards long; at its n. end stands the rotunda, with Rutland square—in its center, the beautiful Ionic portico of the general post-office, and Nelson's monument (upwards of 130 ft. high)—while on the s., it is terminated by Carlisle bridge, and a wedge-like block of noble houses formed by the converging sides of Westmoreland and D'Olier streets. A peculiar feature of D. is its squares, which are very numerous, spacious, and well kept. Stephen's green, the largest, occupies an area of nearly 20 acres, and is about a mile in circuit. Somewhat smaller, but more elegant and aristocratic, is Merrion square (13 acres). The large park and squares of Trinity college occupy more than 40 acres.

The public buildings of D. are famed for their number and grandeur, and appear to more advantage since the dwelling-houses are built of brick. In the first class may be mentioned the bank of Ireland (formerly the house of parliament), Trinity college, the custom-house, and the four courts, which, from the chasteness of their design, and the massiveness of their proportions, have a very imposing effect. The castle has no pretensions to architectural beauty. There are monuments of William III. in College green (once a *green*, but now a paved street); of Nelson, the duke of Wellington, Goldsmith, Burke, Grattan, and many others in various public sites. The benevolent and charitable institutions of D. are very numerous, and are liberally supported.

Within the limits of the circular road, the Liffey is crossed by nine bridges (two of iron), and throughout the whole extent of the city the banks of the river are faced with granite walls and parapets. On each side of these "quays" there is a spacious roadway, with tall houses and excellent shops. The quay proper extends eastward from Carlisle bridge. Near the custom-house, there are several large docks for the accommodation of vessels from distant ports with excisable cargoes, and in communication with the Royal and Grand canals; the former connecting Dublin with the North Shannon and the w. of Ireland, the latter with the s. portion of the same river and the south. A very spacious dock, the "Spencer dock," was opened in 1873; and the harbor has been much improved in late years by the completion of two large breakwaters, the n. and s. walls. There is a bar at the mouth of the harbor, but even there the least depth at low tide is about 11 feet.

The chief manufacture of D. is poplin, which is much celebrated. This, with some glass-works, cotton and linen factories, foundries, distilleries, breweries, and those workshops which are necessary to supply domestic wants, are the main branches of industry. In this regard, D. has been much more of a capital, and less of a manufacturing and export city than London; but a considerable change in the industrial character of the city has been going on for several years. The direct foreign trade, though increasing, is very limited, Glasgow, Liverpool, and Bristol intercepting the greater portion of it. Much of the inland traffic is carried on by the canals above mentioned, and by the railways (now extending to all parts of Ireland), and consists principally of articles of dairy and farm produce from the central counties. The principal banks are the Bank of Ireland, the Royal, the National, Provincial, Hibernian, and Munster, with some private establishments.

The great educational institution of D. is Trinity college and university. See DUBLIN, UNIVERSITY OF. There is also a Catholic university, the medical school of which has been very successful. In regard to schools, D. is not well supplied. The education of the upper and middle classes is left chiefly to private enterprise. For the humbler classes, much has been done by the national board (whose model schools are attended by large numbers of children), by the church education society, the Christian brothers, and Catholic brotherhoods and sisterhoods, and other agencies. There are many literary and scientific societies, dealing with subjects of general knowledge, or with matters of local or national interest. There are two botanic gardens—one at Glasnevin, belonging to the royal Dublin society, and one near Donnybrook, connected with the university. The hospitals, asylums, orphanages, and other charitable institutions are numerous, and liberally maintained.

The municipal affairs are under the control of a town-council, which consists of a lord mayor, 15 aldermen, and 45 councilors. The revenue which they derive from rents, customs, and other sources, was, in 1874–75, £286,804. There is a large police force, which has charge of the city and of all the surrounding country as far as 8 m. from the castle. The city sends two members to parliament. The population of the municipal borough in 1871 was 246,326, of whom 195,180 were Roman Catholics, 39,897 Episcopalians, 4,517 Presbyterians, and the rest of other denominations; of parl. bor. 267,717.

The environs of D. are especially beautiful. Rathmines, a southern suburb, has become a large township, and is the favorite residence of the wealthier part of the mercantile community. Glasnevin, on the n., deserves special notice as the favorite residence of the poet Tickell, of Addison, Steele, Parnell, Swift, Sheridan, and many other celebrated men. In the cemetery at Glasnevin lie the remains of Curran, O'Connell, and Tom Steele. The Phœnix park is a magnificent area of nearly 2,000 acres, in some parts level, in others with broken ground, having a large amount of timber and brushwood, which shelter immense herds of deer. It affords ample scope for military reviews, and is most extensively used by the inhabitants of D. of all classes for recreation. D., as a whole, with its magnificent bay—which has often been compared to the bay of Naples—splendid park, massive public buildings, wide streets, spacious and well-kept squares, clean and elegant quays, and beautiful environs, is one of the most handsome and delightful capitals of Europe.

There are numerous places of worship, Catholic and Protestant, monasteries, convents, friaries, and a Jewish synagogue. The most remarkable among the Protestant churches are St. Patrick's cathedral, restored by the munificence of a single individual, and Christ church, which has also undergone restoration; and among the Catholic, St Mary's, St. Saviour's, St. Augustine's, St. Kivin's.

The number of vessels entered inwards in the port of D. was, in 1875, 7,216, with a tonnage of 1,677,552; cleared outwards, 3,749, with a tonnage of 1,150,256. The customs revenue in 1874 was £1,064,580.

DUBLIN, UNIVERSITY OF. The first university of Dublin was established in connection with St. Patrick's cathedral in 1320; but for want of proper endowments, it never prospered, and dragged out a miserable existence till, probably, the dissolution of the cathedral by Henry VIII.

Foundation.—The existing university was founded in 1591–92, and stands in the position of being a college with university powers. Trinity college, indeed, was intended merely as the *nucleus* of a university, but as no colleges have since been added, it remains in undisputed possession of all university privileges. Queen Elizabeth provided the charter, the corporation of Dublin bestowed the ground and ruins of the suppressed monastary of All-Hallows, and the Irish gentry supplied by subscription the funds necessary for the erection of the buildings. The income of the college was very limited and very precarious, till James I. endowed it with certain estates in the province of Ulster, and a yearly pension of £388 15*s.*, English money, from the public purse.

Constitution.—By queen Elizabeth's charter, the corporation was to consist of a provost, three fellows, and three scholars, in the name of more, with the power of purchasing, taking, and possessing any manors, tenements, etc., from the sovereign, or from any other person. On a vacancy in the provostship, the fellows were entitled to elect a fit successor, and the election of fellows and scholars lay with the provost and fellows. The provost and fellows had full powers to enact statutes, confer degrees, and prescribe the necessary exercises for graduation, and to do all the work of tuition. Defects soon began to show themselves in this constitution, but they were remedied by the new statutes of archbishop Laud, which were definitely published in 1637, and which are in the main still in force. By these the election of provost was given to the crown.

Parliamentary Representation.—In 1613, James I. conferred on the university the right of sending two members to the Irish parliament. One of these was taken away at the union in 1800, but was again restored by the reform bill of 1832. The electors were formerly the provost, fellows, and scholars; but, in 1832, the privilege was extended to masters of arts, and those of higher degree.

Board.—The provost and senior fellows form the board of management of the college. They meet every Saturday, and transact all the financial and other business.

Council.—By letters-patent of 1874, a council was established to co-operate with the board in the regulation of the studies of the university, and in the appointment and regulation of the tenure of office and duties of professors. This council consists of 17 members—namely, the provost of Trinity college, 4 members elected by the senior fellows, 4 elected by the junior fellows, 4 by the professors, and 4 by the senate of the university.

Officers.—The government and working of the university are intrusted to the following officers: the chancellor, vice-chancellor, provost, two proctors (one chosen from the senior, and one from the junior fellows), a senior lecturer (who regulates the public examinations), two deans, and a censor, a librarian, registrars, an auditor, professors, and examiners.

Senate.—The chancellor (or, in his absence, the vice-chancellor or *pro* vice-chancellor), all masters of arts, and doctors of the three faculties, whose names are on the college books, form the senate of the university. The senate elects the chancellor, and confers degrees.

Caput.—The caput of the senate consists of the chancellor, vice-chancellor, provost (or vice-provost), and senior master *non-regent*, who is chosen by the senate. Every *grace* (for the bestowal of a degree) must first receive the sanction of the provost and senior fellows, be afterwards approved of by the caput (each member of which has a *negative* vote), and finally be confirmed by the senate in public congregation.

Provost.—The provost, who is appointed by the crown, may be a layman, of any religious denomination. He enjoys an income of about £3,000 a year.

Fellows (*Senior*).—The fellows are all chosen, in the first instance, by examination; but the seniors are promoted from the juniors, in order of seniority. They have no stated duties, except those connected with the general management of the college affairs. The average income of a senior fellow, from all sources, is about £1380 per annum.

Fellows (*Junior*).—The junior fellows are elected by examination. They form the great teaching staff of the college, and do all the duties of lecturing and examining the undergraduates. Most of them are tutors, and their income, which may average £600 a year, is derived partly from a salary given by the college, and partly from their duties as tutors, lecturers, and examiners. Fellowships were formerly tenable only by members of the Episcopal church, but by the recent act all such religious restrictions were abolished. The number of the junior fellows has been altered from time to time, but by a queen's letter, issued some years ago, it was fixed at 23—the then number of 27 being gradually reducible. The law of celibacy, imposed in the reign of Charles I., was repealed in 1840.

Professors.—There is a very complete staff of professors, who represent almost all subjects of human knowledge. Besides a full complement of lecturers in divinity, natural philosophy, mathematics, law, and medicine, there are professors of ancient, oriental, and modern languages (Irish, Arabic, and Sanscrit being among the number), moral philosophy, oratory and English literature, modern history, political economy, natural history, botany, geology, mineralogy, civil engineering, etc.

Scholars.—The scholars, 70 in number, are elected from among the undergraduates. They are members of the corporation, and have the university franchise. Scholarships (which are tenable for five years) are gained by public competition—some being assigned for classics, and others for science; the provost and senior fellows, assisted by some of the junior fellows or professors, if desired, are the examiners. The various emoluments of a scholar, arising from salary, remission of fees, rooms, commons, etc., amount to about £50 per annum. There are also minor scholarships for the encouragement of the study of divinity and of the Irish language; while others are connected with the royal and endowed schools. Forty exhibitions of £25 per annum each, tenable for two years, have been recently founded, 12 of which are given in each year to students immediately after entrance, and 8 to those who have concluded their second year.

Students.—There are four grades of students. 1. Noblemen, sons of noblemen, and baronets, who have certain special privileges; the first two being allowed the degree of B.A. *per specialem gratiam*. 2. Fellow-commoners, who dine at the fellows' table. 3. Pensioners, who form the great body of the students. 4. Sizars, who have rooms and commons free. The sizars are limited to 30; they are elected by competitive examination, and hold their sizarships (worth about £37 per annum) for four years. Each rank has a dress peculiar to itself.

Entrance.—Students are admitted to the college after an examination in a prescribed course of classics, arithmetic and algebra, English history and composition, and modern geography. The honor of *first place* at entrance examination is keenly contested; and there are, besides, prizes awarded for excellence in special branches of the entrance course, and also for Hebrew.

Tutors.—Each student must at entrance place himself under one of the 18 junior fellows who are tutors. These stand to their pupils *in loco parentis*, and have charge of their tuition, though each tutor does not necessarily teach his own pupils.

System.—To proceed to the degree of A.B., a student must keep terms for four years, two terms at least being necessary in each year. Terms may be kept either by residence, and attendance on lectures, or by simply appearing on a stated day in the public hall, and passing a creditable examination in a prescribed course. Lectures are delivered on the different subjects of each term examination by the tutors, the honor examiners, and the university professors; and prizes of the value of £4 and £2 are awarded at the Michaelmas examination to the *first* and the *second* honor men respectively. In the other terms (Hilary and Trinity), parchment certificates reward the diligent. At the end of the fourth year, gold and silver medals are awarded to the senior and junior moderators. Students of the first year are called junior freshmen; those of the second, senior freshmen; of the third, junior sophisters; and of the fourth, senior sophisters. All students must pursue the following course: *first year*, Latin, Greek, mathematics; *second year*, Latin, Greek, mathematics, logic, and metaphysics; *third year*, Latin, Greek, physics, logic, and metaphysics; *fourth year*, Latin, Greek,

physics (both mathematical and experimental), astronomy, and ethics. For those who aspire to honors, the course is much more extensive than that for mere *pass*.

Degrees.—Term examinations having been duly passed, the student is promoted to the degree of A.B., which is conferred by the senate in full congregation. The *comitia* for granting degrees are held on Shrove Tuesday and the last Wednesday in Trinity and Michaelmas terms. Those students who, at the final ordeal of the fourth year, stand highest in an examination over an extra course in (1) mathematics and mathematical physics; (2) classics; (3) mental and moral philosophy; (4) experimental science; (5) natural science; (6) history and political science; (7) modern literature, are called (according to merit) senior or junior moderators. These form the first class of graduates, the second being called respondents. The third consists of "unclassed candidates." The higher degrees are procurable after the lapse of a fixed number of years, and on the performance of certain exercises, and the payment of fees.

Fees.—For entrance and first half-year the fees are—Noblemen, £60; fellow-commoner, £30; pensioner, £15; sizar, £5 1*s.* 3*d.* Other half-years, £33 12*s.*, £16 16*s.*, and £8 8*s.*—the sizars being exempt. This does not include rooms and commons. For degrees, the fees for pensioners are—A.B., £8 17*s.* 6*d.*; A.M., £9 16*s.* 6*d.*; LL.B., £11 15*s.*; LL.D., £22; B.D., £13 15*s.*; D.D., £26; M.B., £11 15*s.*; M.D., £22

Divinity, Medical, and Engineering Schools.—Connected with Trinity college there are schools for medicine and engineering. The Divinity school of the church of Ireland is also in connection with the university. Graduates in medicine and in engineering must previously graduate in arts. The divinity testimonium is obtained after two years' attendance on lectures, with an examination at the end of each term.

Church Patronage.—The university formerly held a large and valuable patronage, but this has been abolished by the recent church act.

Studentships.—In 1859, 14 studentships were founded, worth £100 a year each, tenable for seven years, to encourage graduates in the pursuit of some special branch of study which they may afterwards be called on to teach, should they become fellows and lecturers. Two are given every year, and (like every other prize or distinction in the university, not connected with the divinity school) are open to persons of all religious denominations. They are awarded to those candidates at the degree examination who take the highest places in science and classics respectively.

General Remarks.—The university of Dublin is well equipped for carrying education to a high degree of perfection. The teaching staff is numerous, and in the actual work of tuition, the tutorial and professorial elements are more largely combined than in any other British university. Many distinguished men have, in past generations, gone forth from her halls. The names of Ussher and Berkeley; of Elrington, Lloyd, Magee, sir W. Hamilton, Romney Robinson, Maccullagh, Archer Butler, lord Cairns; and of Burke, Sheridan, Curran, Swift, and Goldsmith, with a host of others celebrated in politics, in law, in science, and in literature, are sufficient to indicate the success which has attended her sons.

DUBNIT'ZA, a t. in the principality of Bulgaria, 25 m. s.w. of Sophia. It has extensive iron-works, and a pop. of about 6,000.

DUB'NO, a t. in Russia, in the government of Volhynia. Its trade is chiefly in corn, flax, tobacco, fish, and cattle. A large fair is also held here at Whitsuntide. Pop. '67, 7,628.

DUBOIS', a co. in s.w. Indiana, bounded on the n. by White river, and having railroad connection with the Ohio; 420 sq.m.; pop. '70, 12,597. It has a varied surface, with much forest land; good soil, and abundant coal. Chief productions, wheat, corn, and tobacco. Co. seat, Jasper.

DUBOIS, ANTOINE, Baron, 1756–1837; a French surgeon; in 1790, professor in the royal college of surgery; one of the savants selected by Bonaparte to accompany the expedition to Egypt. It is said that at the accouchement of the empress (Marie Louise) his skill saved the lives of both mother and child. He was surgeon-in-chief of the hospital still known by his name. His publications were few, but he devised many new processes, and invented several new instruments.

DUBOIS, GUILLAUME, Cardinal, was b. 6th Sept., 1656, at Brives-la-Gaillarde, in Auvergne, where his father was an apothecary. At the age of 12, he came to Paris, and entered the college of Saint Michel, as a domestic of the principal. Here he made such good use of his opportunies for acquiring knowledge, that he was afterwards selected as tutor to the son of a merchant named Mauroy, and gradually rose till he became tutor to the young duc de Chartres. Although of an ugly exterior, he contrived, by his mixture of wit and hypocrisy, to win the esteem of the boy's mother, while he possessed the most unlimited confidence of his pupil, partly through their common love of letters, and partly because he took upon himself the odious office of pander to his vices. His public career commenced after the marriage of his pupil, in 1692, with Mademoiselle Blois, a natural but legitimatized daughter of Louis XIV. He then received from that monarch, for his services in bringing about the match, a gift of the abbey of St. Just, in Picardy. He was next attached to the French embassy at the court of London, where he formed some important political connections. On his return, he became pri-

vate secretary to his old pupil; and when the latter (now duke of Orleans) became regent in 1715, D. became virtually the most powerful man in France. The great act of his life was the famous treaty signed at La Haye, 14th Jan., 1717, and known as the *triple alliance*, between England, Holland, and France. The importance of this act lies in the circumstance that it effectually changed the foreign policy of France, in spite of the French princes, in spite of the traditions of Louis XIV., in spite of the dislike of the English king for the regent, and finally, in spite of cardinal Alberoni himself, the Spanish minister. In reward for his brilliant dexterity, D. received the office of minister of foreign affairs, and in 1720, on the solicitation of George I. of England, was appointed to the vacant archbishopric of Cambray. In 1721, he obtained the cardinal's hat, and in the following year became prime minister of France, when his authority seemed unbounded. He died 10th Aug., 1723, a victim to hard work and the wildest debauchery.

DUBOIS, JEAN ANTOINE, 1765–1848; a French missionary in the East Indies, where he passed 32 years; author of *Letters on the State of Christianity in India*. He also contributed to the *Bulletin des Sciences*, and the journals of the Asiatic societies. His best known work was *Description of the Character, Manners, and Customs of the People of India, and of their Institutions, religious and civil*, which was published in English by the East India company, and subsequently in French at Paris.

DU BOIS-REYMOND, EMIL HEINRICH, b. 1818; a German scientist; member and perpetual secretary of the imperial academy at Berlin, imperial privy councilor, professor of physiology in the university of Berlin, and director of the physiological apparatus and of the physiological laboratory. He has made many important researches in animal electricity, and published invaluable works on that theme, and on recent progress in anatomy and physiology.

DUBOSSA'RI, or NOVIE DUBOSSARI, a t. in the government of Kherson, European Russia, on the Dniester, 101 m. above Odessa; pop. about 8,000. It is in a picturesque situation, surrounded with fertile fields and gardens, and has a number of important public institutions. Trade is chiefly in wine, tobacco, cattle, and grain.

DUBOV'KA, a t. of European Russia, in the government of Saratov, is situated on the eastern slope of the Sarpa hills, on the right bank of the Volga, in lat. about 49° n., and long. 44° 45' east. It is a depot for goods brought from the northern provinces, which it forwards to Katschalinskala, a town about 40 m. distant from D., and situated on the Don. The produce is thence conveyed by the Don to the southern provinces. D. has some trade in wood, oil, iron, and manufactured articles. Pop. '67, 13,676.

DUBS, JAKOB, b. 1822; a Swiss politician; studied law at Heidelberg, Bern, and Zurich; in 1847, he was elected to the grand council; afterwards to other offices in his native canton. In 1857, he was president of the federal court; and, 1864 and 1870, president of the confederation. In politics he is a liberal, and has promoted many reforms. He is the author of a number of political works.

DUBUFE, ÉDOUARD, b. Paris, 1818; studied under his father, Claude Marie, and Paul Delaroche. He successfully followed his father's sentimental style, but afterwards painted Scriptural subjects. His later work has been chiefly in portraits, among them the empress Eugenie, Rosa Bonheur, and the members of the congress of Paris. Three of his large compositions have been exhibited in the United States—"The Prodigal Son," "The Conscript's Departure," and "The Soldier's Return."

DUBUQUE, a co. in e. Iowa, on the Mississippi river, watered by branches of the Maquoketa, crossed by the Dubuque and Pacific railroad; 625 sq.m.; pop. '75, 43,845. It is hilly and well timbered, with fertile soil, producing wheat, corn, butter, etc. There is abundance of lead ore, and more than 100 mines are in operation. Co. seat, Dubuque.

DUBUQUE, a city and port of Iowa, U. S., on the right bank of the Mississippi, 450 m. above St. Louis, built on a bluff 200 ft. high, contains a city hall, market-house, U. S. custom-house, Episcopal seminary, surveyor-general's office, 14 Protestant and three Catholic churches and cathedral, eight newspapers, of which two are German. Settled in 1788, by Julian Dubuque, a French trader, it became the center of a large trade, and is the chief depot of the great lead region of Illinois, Wisconsin, and Iowa. Pop. '60, 13,012; '70, 18,434.

DUBUQUE (*ante.*), a city in Dubuque co., Iowa, picturesquely situated on a low terrace and on high bluffs on the w. bank of the Mississippi river, 155 m. w. of Chicago; pop. '75, 23,605. It is the center of an important railroad system; and the river is here crossed by an iron railway bridge to Dunleith, Ill. Dubuque is a port of entry, and has a collector and a custom-house, and is the most important center of trade in the lead region. Its annual export of lead, taken from the mines near the city, is from 10,000,000 to 20,000,000 lbs. The river commerce in produce and manufactures is also large, the country around being an excellent agricultural region. There are several fine churches. The Roman Catholics and the Episcopalians have bishops in the city. Of educational institutions there are St. Joseph's college and academy, and St. Mary's academy, both Roman Catholic, and several schools under control of the same denomination. Besides

these there are the Iowa institute of science and art, a German Presbyterian divinity school, and manufactories for farming tools, engines, machinery, leather, bricks, lead, flour, soap, etc. The place was named from Julien Dubuque, a French Canadian, who settled on the spot in 1778, with permission from the Spanish government to carry on mining. The permanent settlement was in 1833; town incorporated 1837; chartered as a city 1840.

DUCANGE. See DUFRESNE.

DU'CAS, MICHAEL, lived about the middle of the 15th c.; a Greek historian, of a family that gave several emperors to Constantinople. After the fall of that city he was employed in diplomatic business. He wrote a history beginning at the death of John Palæologus and extending to the capture of Lesbos in 1462, which is a valuable source of information concerning the close of the Greek empire.

DUC'AT, one of the most extensively used names for a coin, mostly of gold. Ducats were first coined in the 12th c. in Sicily, and took their name from the legend found on those early Sicilian pieces: *Sit tibi, Christe, datus, quem tu regis, iste Ducatus* (*ducatus* means duchy). Such coins were extensively issued after the 12th c. in Italy, especially at Venice. Venice ducats were called *Zecchini*, from *Zecca*, where the mint was situated. The ducat was adopted in 1559 by the imperial diet of Germany into the currency of the empire, and was afterwards coined in the several German states, and over the whole of the north of the European continent, Russia included. They generally bore the likenesses of the sovereign princes. The ducat varied in weight and fineness; by far the most common, which was current in Austria, Russia, Hamburg, etc., weighed 54 troy grains, sterling value about 9*s.* 4*d.* The modern Italian ducat was of much less value. The gold ducat of Venice was valued at 6*s.* In the (late) kingdom of the Two Sicilies, the ducat (ducato del regno) was a silver coin and money of account, forming the unit of the currency, being divided into 100 grani, in the island of Sicily into 100 bajocchi. There are few silver ducats, however, in existence. The ducat = 3*s.* 4*d.* sterling. There are various kinds of the Spanish *ducado*, generally translated dollar. The ducado de plata, or silver ducat, hard = 4*s.* 2*d.* The ducat is now, to a great extent, merely a money of exchange.

DUCA'TO, CAPE (anciently *Leuca'tés*), a headland at the southern extremity of a promontory of Santa Maura, one of the Ionian island, in lat. 38° 34′ n., and long. 20° 32′ east. Cape D. was in ancient times dreaded by mariners, and the modern Greek sailor still fears the strong currents and the fierce gales which he has to encounter there. A point on the western side of the *Leucadian* promontory is called *Sappho's Leap*, as it was supposed that here the poetess precipitated herself into the sea. It is a white, broken cliff, rising perpendicularly from the water to the height of about 2,000 feet. On its summit stood a temple dedicated to Apollo, the substructure of which still exists.

DU CHAILLU, PAUL BELLONI, a distinguished traveler, was b. in the s. of France, about 1820. His father was for many years a merchant trading on the Gaboon (q.v.) river, in western Africa, and thither he was carried when a boy. He lived there for several years, and became familiar with the habits and languages of the natives, thus—as well as in his habituation to the climate—unconsciously preparing himself for the explorations which he was afterwards to undertake. In 1842, the French made a settlement and built a fort on the Gaboon. Under the protection of this fort, both the elder and younger Du C. resided and carried on their commercial pursuits for some years. Du C. afterwards went to America, where he resided for a number of years, and was naturalized by the legislature of the state of New York. In Oct., 1855, he sailed from New York to w. Africa, where he spent four years in explorations, making many interesting discoveries, and traveling, as he himself tells us, about 8,000 miles, always on foot, and unaccompanied by other white men. He returned to America, and after subjecting his specimens in natural history and ethnological notes to the examination of the scientific men of New York and Boston, he crossed the Atlantic to England, and published a volume of travels—*Explorations and Adventures in Equatorial Africa, with Accounts of the Manners and Customs of the People, and of the Chase of the Gorilla, Crocodile, Leopard, Elephant, and other Animals* (Lond. 1861). His travels were in a region lying between n. lat. 1° 30′, and s. lat. 2°, and extending from the coast to about e. long. 14° 15′; and the work in which he gives an account of them contains very important contributions to geographical, ethnological, and zoological science. Under the first of these heads must be ranked, as of chief importance, the information concerning the Fernand Vas, Ogobai, and Rembo rivers (see OGOBAI, or OGOWÉ), and concerning the mountain chain which, between the equator and s. lat 1°, stretches from w. to e. from the neighborhood of the coast far into the interior of Africa. He made known the existence and described the characteristics and habits of a number of African tribes, among which particular interest attached to his account of the Fans (q.v.), a cannibal tribe, inhabiting a region on the western side of the coast-range of mountains, just to the n. of the equator. His contributions to zoology related not only to the gorilla and other remarkable apes, some of them previously quite unknown, but included also many new species of mammals and birds. Many of the statements contained in his volume, however, being very extraordinary, it was received with much distrust, and was

subjected to very adverse criticism; to which it was the more exposed because the author's journals having been put into the hands of a literary gentleman in America to be prepared for the press, separate journeys were mixed up in the narrative, and the chronology was thrown into confusion. Much discussion took place in newspapers and periodicals, and some writers went so far as to assert their belief that Du C.'s stories about the gorilla were entirely fabulous, and that he had never seen the animal alive, but had purchased the specimens which he brought to England from natives on the coast. His descriptions of nest-building apes were, of course, also received with incredulity, and the truth of his account of the cannibal Fans was much doubted. The maps drawn up by Dr. Barth and Dr. Petermann in 1862 moved the positions of all the places which he had visited much nearer the coast than he had fixed them, so as greatly to reduce the length of his routes. The general trustworthiness of Du C.'s narrative was, however, maintained by some men of the highest eminence, and particularly by sir Roderick Murchison and Dr. Owen. Du C. resolved to confute his opponents, and vindicate his own reputation, by another expedition to Africa, for which he prepared himself by a course of scientific study, to enable him to make astronomical and other observations, and by acquiring the art of photography. During his first explorations, he had laid down the position of places from compass-bearings only. The substantial accuracy of his observations was, however, in the meantime confirmed by a French government expedition under Messrs. Serval and Griffon du Bellay, which explored the Ogobai river in 1862; and Dr. Petermann then reconstructed his map of that part of Africa as Du C. had originally laid it down. His statements regarding the cannibalism of the Fans were also confirmed by capt. Burton, who himself traveled among them. Du C., however, proceeded on his second expedition. He freighted a small schooner, and sailed in her from England on 6th Aug., 1863, carrying with him not only an ample store of scientific apparatus, but also of goods for presents to the natives, or barter with them. He reached the mouth of the Fernand Vas river on 10th Oct., and was warmly welcomed by the African chiefs whom he had formerly known; but he sustained a grievous misfortune in the loss of all his scientific instruments and many other valuable articles, through the swamping of the canoe by the surf, as they were being landed from the schooner. He was compelled to send to England for another set of instruments, and to wait till they arrived. Meanwhile, he made several excursions in the neighborhood of the coast, through the almost impenetrable jungle which covers the western coast regions of equatorial Africa, and had abundant opportunity of confirming his former observations regarding the gorilla. He also had live ones caught and brought to him by the natives. In Sept., 1864, Du C. having received his new supply of instruments from England, started on his expedition for the exploration of the interior. He was attended by a body-guard of ten Commi negroes, in thick canvas trousers, blue woolen shirts, and worsted caps, each man having a blanket to keep him warm at night. There was difficulty, however, in getting leave to set out on the expedition at all. It is the universal rule among the coast tribes of w. Africa to prevent, if possible, all strangers from penetrating into the interior, even if it be only to the next tribe, through fear that the exclusive privilege of trading with that tribe should be lost. A grand *palaver* was held on the subject, and it was at last agreed that Du C. should be allowed, as a special favor, to ascend the Fernand Vas or Ogobai, as his object was not to trade, but to shoot animals, and to bring away the skins and bones. "Truly," the chiefs and councilors said, "we do not know what Chaillie has in his stomach to want such things, but we must let him go." Du C. revisited some of the scenes of his former explorations—the Ogobai, the Rembo, and their branches. He suffered great hardships, being sometimes at a loss even for food, and his attendants being almost all at one time ill of small-pox, which made fearful havoc among the native population, and exposed him to the dangerous suspicion of having caused it by witchcraft. He passed through a forest district so dense that animal life is scarcely found in it, and an almost unbroken silence prevails by day and by night. He found also in his journeyings many scenes of extreme beauty, scenes of mountain and meadow, hill and pasture-land, groves of plantains, groves of lime-trees remarkable for dark foliage, stately palms, and clear sparkling streams. An unfortunate misunderstanding took place at last between Du C.'s party and the inhabitants of a village which he had reached. A conflict took place, the natives became exasperated, and it was with difficulty that the traveler escaped, being obliged, however, to resign all thought of proceeding further. He reached the mouth of the Fernand Vas river on 21st of Sept., 1865, and found a vessel there loading for London. He had lost everything but his journals; all the treasures in natural history which he had collected were gone. He brought home, however, his astronomical observations, which have been carefully examined by the most competent persons, and the map of western equatorial Africa has been made much more complete and correct than before. Du C. did not penetrate, on any of his journeys, much more than 240 m. in a direct line from the coast, but his discoveries have been numerous and important, and amongst them are about eighty new species of mammals and birds. No one now doubts the right of Du C. to be ranked among the most enterprising and truthful of travelers. The account of his second expedition to Africa is entitled *A Journey to Ashango-Land* (Lond. 1867). His ethnographical observations were published in *My Apingi Kingdom* (1870); and *The Country of the Dwarfs* (1872).

DU CHAILLU, PAUL BELLONI, b. Paris, 1835; son of a trader to the w. coast of Africa, where the boy passed some time at an early age, and acquired knowledge of the language and modes of life of the neighboring tribes, and of natural history. In 1852, he traveled through the United States, and published a series of papers on the Gaboon country. In Oct., 1855, he left New York to explore equatorial Africa, and spent nearly four years in the work, reaching to about 14° 15′ east. During this trip he shot and stuffed more than 2,000 birds, of which 60 were species before unknown. He also killed more than 1000 animals, among them several gorillas, a species probably never before seen by Europeans. In 1859, he returned to the United States with his natural history specimens and a great collection of arms and domestic implements. He published an account of his trip in *Explorations and Adventures in Equatorial Africa.* I was one of the first to describe the gorilla; and the truth of his narrative was strongly attacked, and as stoutly defended, mainly by English savants. This provoked the traveler to undertake a second journey, and he sailed from England for that purpose in Aug., 1863. He went over much of his course on his first trip, but explored some new regions. In Sept., 1865, he was compelled to return to the coast in consequence of the hostility of the natives, having lost everything except his journals. This venture was detailed in *A Journey to Ashango Land.* He lectured in the United States, where he fixed his residence, and in 1872–73, made a trip in Norway, Lapland, Sweden, and Finland. Besides the works named he has published *The Gorilla Country; Wild Life; Lost in the Jungle; My Apingi Kingdom;* and the *Country of the Dwarfs.*

DU CHÂTELET. See CHÂTELET LOMONT, *ante.*

DUCHÉ, JACOB, D.D., 1739–98; b. Philadelphia; graduate of the college of that city in 1757, completing his education at Cambridge, Eng. In 1775, he was rector of Christ church in Philadelphia. The next year he was chaplain to the first continental congress, and gave all his salary for the relief of the families of soldiers killed in the war. His courage gave out on the capture of Philadelphia by the British, 1777, and he wrote to Washington urging him to cease what seemed to be a hopeless struggle. The letter was laid before congress, and Duché fled to England, and his property was confiscated. He returned in 1790, but could not regain position or influence.

DUCHESNE, ANDRÉ (in Latin, Andreas Chesnius, or Duchenius, or Quercetanus), the father of French history, was b. at Ile-Bouchard, in the old province of Touraine, in May, 1584, and studied at Loudun and Paris. History and geography were his favorite studies from his youth, and under Richelieu's ministry he was appointed royal geographer and historiographer. He d. 30th May, 1640, by a sad accident, having been crushed against a wall by a carriage in a narrow street. His collection of the *Historiæ Francorum Scriptores Coætanei ab ipsius gentis origine ad Philippi IV. tempora* (5 vols., Paris, 1636–49), is particularly important. It was continued from the third volume by his son, FRANÇOIS DUCHESNE (born 1616, died, after having likewise been appointed historiographer, in 1693), and contains much that may be sought for in vain in Bouquet's collection. Of his other numerous writings, we may mention, as deserving of special notice, the *Historiæ Normannorum Scriptores Antiqui* (Paris, 1619); *Histoire Généalogique de la Maison de Montmorency et de Laval* (Paris, 1624); and *Histoire Généalogique de la Maison de Vergi* (Paris, 1625). The last two throw much light upon the history of France. D.'s industry was extraordinary; he is said to have left more than a hundred folios in manuscript.

DUCHOBORTZI, a Russian religious sect, of the origin of which nothing is very certainly known, and which, although conjecturally referred by count Krasinski to the Patarenes (see CATHARI), cannot be traced beyond the middle of the 18th c., when it was found to exist in different parts of Russia; and its members became exposed to penalties by their refusal to serve in the army. The D. hold the doctrine of the Trinity, and are chiefly distinguished by their holding that human souls existed before the creation of the world, and fell in that former existence, from which the fall of Adam and a continual tendency to fall have proceeded; and by their ascribing hidden mysterious meanings to all parts of the Bible, for the knowledge of which they depend on inward light. They are extreme mystics. They reject the use of pictures common in the Russian Greek church. They neither observe baptism nor the Lord's supper. In their religious meetings they salute each other with bows and kisses: they pray, sing psalms, and exhort or expound the Scriptures. They are, however, generally very illiterate and ignorant. On the accession of the emperor Alexander I., they received the most complete toleration, and were allowed to settle by themselves on the bank of the Molochna in the s. of Russia. Here, however, an impostor named Kapustin prevailed on them to receive him as a prophet, taught them the transmigration of souls, and made them believe that he himself was animated by the soul of Jesus Christ; and it would appear that, in consequence of disputes arising among them concerning him, great numbers were buried alive, and otherwise put to death by the rest, on which the settlements on the Molochna were broken up in 1841, and great part of the people transferred to the provinces beyond the Caucasus.

DUCK, a kind of plain linen of a coarse, heavy make, highly glazed, used for smock-frocks by the English agricultural laborers, and for working-dresses by those employed at smelting furnaces and iron [illegible]

DUCK. See ANAS. The broader bill, laminated and not toothed, distinguishes the Linnæan genus *anas* from *mergus* (including smews, mergansers, and the goosander). In recent ornithological systems, however, it is divided into numerous genera, but three chief groups are usually recognized, corresponding to swans, geese, and ducks of popular nomenclature. See GOOSE and SWAN. The group to which the name D. is sometimes extended, both by scientific writers and in popular language, is characterized by greater breadth of bill than either the swans or geese. Their food is chiefly animal, whilst that of both swans and geese is in great part vegetable. Their legs are shorter and placed further backward than those of geese, so that they move with greater difficulty and with a more waddling gait on land, and their necks are shorter than those of geese, and much shorter than those of swans, although in this character there is a considerable difference between different species. There is a very marked difference in plumage between the males and females, which is not the case in any corresponding degree in swans and geese. They exhibit also a peculiar anatomical character in a large dilation of their trachea (windpipe) on each side at its bifurcation. This great group of ducks is subdivided into two sections; one section characterized by a webbed or broadly margined hind-toe, the other by a hind-toe destitute of membrane. These characters are connected with important differences in other respects, and particularly in habits; the ducks of the first section being chiefly oceanic, living more exclusively on animal food, and diving readily and frequently in pursuit of it; whilst those of the second section are more generally inhabitants of lakes and other inland waters, showing a preference for shallow waters. Those of the first section also have the feet placed further backward than those of the second; those of the second have generally longer wings than those of the first, and a longer neck by which they are adapted for seeking their food by dabbling in muddy shallows, they less frequently dive, and when alarmed, generally seek safety by taking wing. Many of both sections are migratory, and spend the summer in arctic and sub-arctic regions. Not a few of them are common to the northern parts of both the eastern and western continents. Their plumage is remarkably thick, soft, and compact. The tongue, which, unlike that of most birds, is large and fleshy, assists in the selection of food. To the first or oceanic section of ducks belong scoters, garrots, eiders, pochards, scaups, harelds, etc.; to the second section belong shieldrakes, shovelers, musk ducks, summer D., pintails, gadwalls, teals, wigeons, bluewings, etc.—See these articles.

The COMMON DUCK, or DOMESTIC DUCK (*anas boschas*), known also in its wild state as the WILD DUCK or MALLARD, belongs to a genus, or sub-genus, of the second section, characterized by a flattish broad bill, longer than the head, not contracted, nor much dilated, towards the tip, and not much elevated at the base, destitute of tubercle at the base, the denticulations of the upper mandible (ends of the laminæ) scarcely projecting beyond the margin, and a short and rather pointed tail of 16 feathers. Even as thus characterized, it includes teals (q.v.), which are by some ornithologists constituted into a separate genus. The male (drake) of the common D. has the four middle tail-feathers recurved. The deep emerald green of the head and upper part of the neck, the white collar which separates the green from the dark chestnut of the lower part of the neck, and the deep blue iridescent *speculum* of the wing—formed by the outer portion of the outer web of the secondaries—are also marked characteristics of this beautiful bird; the plumage of which exhibits greater brightness of colors—during the breeding season at least—in the wild than in the domestic variety. At the close of the breeding season, the male of the wild-duck assumes for a time a plumage more sober, and resembling that of the female; but before winter, the splendid plumage proper to his sex is again acquired. The mallard or wild-duck is a widely-distributed bird, being found in the northern parts of Europe, Asia, and America, and extending southward as far as Florida—where it is abundant—and the West Indies, although in the old world it is not known as belonging to regions of similar climate. It was formerly much more abundant than it now is in Britain, the drainage of marshes having apparently tended more than any other cause to the diminution of its numbers. Multitudes of mallards, however, still visit the fen counties of England in winter; and great numbers are taken in decoys, along with other *anatidæ*, and sent to the London market. See WILDFOWL. Many wild-ducks, however, still breed in Britain, sometimes near the lakes or rivers which they frequent, sometimes in more elevated moorish districts, from which the parents often take opportunity of bringing their very young brood to the lower waters, by swimming down the streams on some occasion of their being swollen by rain, and it is interesting to see the little creatures hurried on, without injury, by the current, and passing along narrow rapids and over waterfalls of considerable height, much as pieces of cork might do, and with as little apparent injury. The nest is composed of grass, intermixed and lined with down, and the eggs are usually 9 to 12 in number.

This species, in a wild state, always pairs, but in domestication it becomes polygamous, and the care of the young is left entirely to the female. It has been long common in the poultry-yard, being valued for its eggs and its flesh; and there are breeds, as the Aylesbury D., etc., remarkable for their great size and delicacy of flesh. In situations where they have ready access to a lake, pond, or stream, ducks are easily managed, and very useful poultry. In other circumstances, they cannot be kept with advantage.

The species most nearly allied to the common D. is said to be the JAVANESE DUCK

(*A. Javanensis*). The BLACK DUCK or DUSKY DUCK (*A. obscura*) of North America is also very nearly allied to it, and is generally distributed from Labrador to Texas. The summer D. or wood D. of North America, and the Mandarin D. or Chinese D., belong to a nearly allied genus or sub-genus (*dendronessa*), with shorter bill and pendent occipital crest. See SUMMER DUCK. The TREE DUCK, or WHISTLING DUCK, of the warmer parts of America, also belongs to a distinct but nearly allied genus or sub-genus (*dendrocygna*).

DUCK-BILL, *Ornithorhynchus*, or *Platypus*, a genus of *mammalia*, of the order *monotremata* (q.v.). Only one species is fully ascertained, *O. paradoxus* or *P. anatinus*. It inhabits the rivers of Australia, Papua, and Tasmania. In the Australian colonies it is generally called WATER MOLE. The first descriptions of this singular quadruped were received with incredulity, and even when a stuffed specimen was brought to England, it was suspected to have been ingeniously fabricated. The whole length, including bill and tail, is usually from 20 to 23 inches. The body is rather long and compressed, thickly covered with very glossy hair, among the roots of which there is a layer of soft short waterproof felt or wadding. The head is small and round, with small bright eyes, and no external ears, although the internal ears are perfectly developed, and the hearing acute; and instead of the muzzle, mouth, and teeth of an ordinary quadruped, the creature is furnished with a bill like that of a duck, but broader in proportion, near the extremity of the upper mandible of which the orifices of the nostrils are placed. The bill is covered with a leathery membrane. There are no true teeth, but the bill has small transverse laminæ, like the bill of a duck; and at its base, on each side of each jaw, are two horny protuberances without roots or bulbs. The tongue is beset with villosities, does not extend to the extremity of the bill, and bears at its base what has been described as another tongue of a thicker form, and with two little fleshy points in front. The legs are short; the fore-feet have each five toes, with strong burrowing claws, and a connecting membrane for swimming, which extends even beyond the claws, but is capable of being folded back, so as not to impede their use in burrowing. The hind-feet are smaller than the fore-feet; they have each five toes armed with claws, and webbed, but the web does not extend beyond the base of the claws. The hind-feet of the male are armed with sharp spurs, like those of a cock, which are merely rudimentary in the female. These spurs were at one time erroneously supposed to be venomous. The tail is strong, broad, and flattened, about half as long as the body, covered with longer and coarser hairs, and nearly naked on its under surface. The duck-bill, besides the characteristics of the *monotremata*, exhibits other anatomical peculiarities which resemble those of birds, and some—principally osteological—which even resemble those of saurian reptiles. It lives chiefly in the water, and seeks its food by means of its bill in the mud, like ducks. Its food consists chiefly of aquatic insects, mollusks, etc.; but it is said also to feed on small fish, and even on vegetable food; and in confinement, it can be fed on worms, mince-meat, or egg, and bread and milk. It makes serpentine burrows of great length—20 or even 50 ft.—in river-banks, entering near the water's edge, and enlarged at the termination into a receptacle or nest, which is furnished with dry weeds for the accommodation both of parents and young. The young are produced in a very imperfect state: the duck-bill is indeed strictly ovoviviparous; the fetus receives no nutriment from the parent before birth, except what it derives from the ovum, which, however, is hatched within the body of the parent; but the young are suckled, and the mouth is adapted to this by the comparative shortness of the bill and greater length of tongue at this period of life. The duck-bill is lively and active, and so readily alarmed by the appearance of danger as not to be easily shot, diving before aim can be taken. It is usually to be seen with only its head above the surface of the water. It prefers the twilight to the glare of day. Its voice resembles the growl of a small puppy. It carefully dresses and pecks its fur. When asleep, it rolls itself up into a ball.

DUCK CREEK, a water-course of central Australia, is the largest of the channels which drain into the Darling (q.v.).

DUCKING-STOOL, an apparatus at one time in use in Britain for the punishment of scolding wives. The ducking-stool grew out of the cucking-stool, which was not, as many have supposed, a mere difference of name for the same thing. The cucking-stool of itself did not admit of the ducking of its occupants. It was a simple chair in which the offender was placed, usually before her or his (for the cucking-stool was not so specially for women as the ducking-stool) own door, to be pelted and insulted by the mob. In conjunction with another instrument of degradation, however—the tumbrel—the cucking-stool was occasionally used for ducking; but the ducking-stool *par excellence* was specially made for purposes of immersion. There were various examples of the ducking-stool. Sometimes it "consisted of a rough strong chair attached to one end of a beam, which worked on a pivot on a post bedded into the ground at the edge of the dam," or the river, as the case might be. "The woman was placed in the chair with her arms drawn backwards; a bar was placed across her back and in front of her elbows;" another bar held her upright, and there were cords to tie her securely in. The executers of the punishment then took hold of a chain at the opposite end, and gave her a ducking on the "see-saw" principle. A ducking-stool was in use for actual duck-

ing at Leominster as recently as 1809. The beam to which the chair was attached was 23½ ft. in length, the ducking being administered in the manner previously described. Other ducking-stools consisted of an upright and transverse beam, either movable or fixed, from which the chair was suspended by a rope or chain. The practice of ducking commenced in the latter part of the 15th c., and prevailed generally throughout the kingdom until the first part of the 18th c., and in isolated cases, as we have seen, even into the 19th century.

For the facts of this article we are indebted to a paper by Mr. Llewellynn Jewitt in the *Reliquary*. See also Chambers's *Book of Days*.

DUCKWEED, *Lemna*, a genus of plants, referred by many botanists to the natural order *araceæ*, but regarded by others as the type of a small natural order, *lemnaceæ*, which consists chiefly of floating plants, mere flat green fronds, with roots hanging loosely in the water, and unisexual flowers—destitute of calyx and corolla—bursting through a membranous spathe in their margin. The *lemnaceæ* are distributed throughout all parts of the world. Several species of D. are British, and cover the surface of stagnant ponds with green vegetation. Their flowers and fruit are rarely to be seen, but they spread rapidly by new fronds budding from their margins.

DUCLOS, Charles Pineau, 1704–72; a native of Brittany; writer of romance and history. Among his works were *Acajou and Zirphile; The Baroness de Luz;* and *Confessions of the Count de XXX*, all romances; *History of Louis XI.; Secret Memoirs of the Reigns of Louis XIV. and XV.; Considerations on Italy*, etc. Though living in Paris he was elected mayor of Dinant, and was chosen deputy to the assembly of the states of Brittany. At the request of that body he was granted a patent of nobility.

DUCORNET, Louis César Joseph, 1806–56; a French artist. He was born without arms, and learned to use his feet for hands. Having a talent for painting, he made such excellent drawings with his toes that at the age of 13 he was taken into the academy as a pupil. When but 16 he took the first prize for drawings of the human form, and both the national government and his native city settled pensions upon him. Not only was he without arms, but he had only four toes on each foot, and his lower limbs were far from perfect. In conversation, he gesticulated with his legs. He was expert in painting, and among his best efforts were "Parting of Hector and Andromache," and "Edith Finding the Body of Harold."

DUCROT, Auguste Alexandre, b. 1817; a French general, educated at St. Cyr; served in Algeria and Africa, and in 1869 in command of the 6th division quartered at Strasburg. He fought at Sedan, and when MacMahon was wounded, took the chief command. After surrender he refused to accept conditions, escaping to Paris, and took command of the 13th and 14th army corps. He participated in the last disastrous sortie, Jan. 19, 1871. After the fall of Paris he was elected to the national assembly. He published *The Truth about Algeria; The Day of Sedan;* and some other works.

DUCTIL'ITY is that property of bodies by which they are capable of being drawn out in length, while diminishing in breadth, without fracture or separation of their parts. Ducility is peculiarly noticeable in the case of metals. It is possessed also by gums, glues, resins, and some other bodies, which, when softened by water or heat, may be drawn into threads. Clays, when moistened, become ductile. Metals are ductile, generally speaking, at any temperature, but their D. is much influenced by temperature; some—brass, for example—are more ductile at ordinary temperatures than when hot. Metals are ductile nearly in the order of their malleability (q.v.), the order of their D. being as follows, beginning with the highest: gold, silver, plantinum, iron, copper, zinc, tin, lead, nickel, palladium, cadmium. Some, however, as iron, are more ductile than malleable. The D. of gold and glass is surprising; see article Divisibility for an account of the fineness to which gold-gilt, silver wire, and glass tubes have been drawn. The D. of glass at red heat seems to have no limit; at high temperatures, this brittle substance may be drawn into threads finer than any hair, and of the highest flexibility. Its flexibility, indeed, according to some, increases in proportion to the fineness to which its threads are drawn, and it is conceived to be possible that we may yet convert glass into cloths for wearing apparel.

DU DEFFAND, Marie de Vichy Chamrond, Marquise, a celebrated Frenchwoman, was b. of a noble family of Burgundy in 1697, and educated at the convent of La Madeleine de Trenelle, in Paris. Here she manifested that boldness of opinion and vivacity of intellect which obtained for her so many distinguished admirers in after-years. Her parents, alarmed at her skepticism, sent the eloquent Massillon to converse with her, who was, however, more struck with the wit and beauty of the young lady, than she was with the force of his arguments. In 1718, she married the marquis Du Deffand. The union was unhappy, and a separation took place, whereupon the marquise threw herself into all the excesses of gallantry which characterized French society in the 18th c., and had the name of being, for a time, the mistress of the regent. Subsequently a reconciliation took place between her and her husband, but it lasted only a short period. She then set up an establishment of her own, and gathered round her all the wits, philosophers, and men of fashion in her day. Among her friends and correspondents may be mentioned D'Alembert, Voltaire, president Hénault, Montesquieu, Marmontel, and

Walpole. Her evening-parties at her residence in the rue St. Dominique were famous. They formed a rendezvous for all the notabilities of Paris, and were much relished by distinguished foreigners visiting the city. In 1753, she became blind, and in the following year chose as companion and reader a young lady, Mlle. de l'Espinasse, of whom, however, she became very jealous, on account of the attentions paid to her by the friends of the marquise. In 1764, the two ladies separated, Mlle. de l'Espinasse carrying with her a large number of enthusiastic partisans, who deserted the saloon in the rue St. Dominique, at the head of whom was D'Alembert. The marquise Du D. died 24 Sept., 1780. Her correspondence with D'Alembert, president Hénault, Montesquieu, and the duchesse du Maine was published in 1809; and in the following year appeared at London her correspondence with Horace Walpole (written between 1766 and 1780), to which were added her letters to Voltaire.

DUDEVANT, Amantine Lucile Aurore, Madame, a French authoress, who has attained an extraordinary celebrity under the name of George Sand. She was b. at Paris in 1804, and descended by the father's side from the famous marshal de Saxe. Her maiden name was Dupin. After having received a strict conventual education (1817–20), she married M. Dudevant in 1822; but in the course of a few years, finding the lack of congeniality of sentiment intolerable, she arranged a separation with her husband in 1831, and repaired to Paris, where at first she was hard pushed to secure a livelihood. Her first literary efforts made their appearance in the *Figaro*. In conjunction with her friend and companion for the time, Jules Sandeau, from whose name she formed her *nom de plume*, she wrote a romance, entitled *Rose et Blanche* (1832), which only occasionally rises above mediocrity, and gave no hint of the splendid ability first fully developed in *Indiana*, published in the same year. This romance, in which a glowing heart, deeply wounded by the pressure of social relations, gives vent to its feelings, excited considerable interest. This was increased to the utmost by the succeeding romances—*Valentine* (1832); *Lélia* (1833); *Jacques* (1834); *André* (1835); *Leone Leoni* (1835); and *Simon* (1836). During the next two years, she published a great variety of works, in which she showed herself to be deeply influenced by the age in which she was living. In addition to her purely imaginative productions, Madame D. found time to contribute miscellaneous essays and political articles to the journal entitled *Le Monde*, so long as it was edited by Lamennais. She was much occupied at this time with philosophical and theological speculations, and their influence may be traced in the *Spiridion* (1839), and the extraordinary piece of prose poetry, entitled *Les Sept Cordes de la Lyre* (1840). She cherished, moreover, republican ideas of the wildest nature, which appeared conspicuously in the *Compagnon du Tour de France* (1840), and in *Pauline*. Her brilliant literary success having now placed her in comfortable circumstances, she obtained a legal divorce from her husband, and thus secured possession of a portion of the property which she had brought to him as her dowry. She now occupied herself with the education of her two children, and spent her time, sometimes in Paris, sometimes at her estate in Berri, where she had passed her childhood, or in journeys into Switzerland and Italy. A dispute with the editors of the *Revue des Deux Mondes*, which, from 1833 to 1841, had regularly published her works in chapters before they appeared in a separate form, induced her to start the *Revue Indépendante*, in conjunction with P. Leroux and Viardot. For this new review, she wrote *Horace*, *Consuelo*, and *La Comtesse de Rudolstadt* (1842–43), three romances deeply imbued with democratic feelings and sentiments, which are apparent likewise in *Jeanne* (1844), and which in the *Meunier d'Angibault* (1845), becomes altogether socialistic. It would be impossible to enumerate the works which flowed from her rapid pen between this period and the revolution of 1848. It is sufficient to say that her socialistic sympathies predominate in all of them; but if the logic is not convincing, the vigor and purity of her imagination are undeniable. This is always the case with Madame Dudevant. Even those who disapprove of her exaggerated and one-sided ideas, and views of life, must admire the perfect form, the captivating style, the plastic finish, and the great affluence of thought and sentiment displayed in all her productions. Her finest romances are *Valentine*, *André*, and, in particular parts, *Consuelo*, which is her best known work. Of her smaller pieces, *La Mare au Diable*, is a masterpiece of its kind, and indeed, considered from an æsthetic point of view, is the most complete production of her pen. After the revolution of Feb., Madame D. for a short time wasted her talents on the barren politics of the day. She subsequently devoted herself to writing plays, which were received less favorably than her novels, though the *Marquis de Villemer*, and one or two more, were very successful. In 1854, she published *Histoire de Ma Vie;* in 1871, *Journal d'un Voyageur pendant la Guerre;* and in 1873, *Impressions et Souvenirs*. Madame D. died on June 8, 1876.

DUD'LEY, a parliamentary borough in a detached part of Worcestershire, in the s. of Staffordshire, 26 m. n.n.e. of Worcester, and 8¼ m. w.n.w. of Birmingham. It is a well-built town, and a chief seat of the iron trade. On the n.e. of the town are the beautiful ruins of an old castle, founded in 760 by Dodo, a Saxon prince. It was demolished in the time of the civil wars of Charles I., was rebuilt, but was afterwards burned down in 1750. In the vicinity are iron and coal mines, and limestone quarries. The limestone is Silurian, and full of organic remains; it is wrought out of caverns, and brought

to the kilns through a tunnel one mile and three quarters long, which is carried through the basalt of the castle hill. Saline springs occur near. The chief manufactures are fire-irons, grates, nails, vices, chain-cables, other iron utensils, and glass. Pop. '71, m. b., 43,782; par. b., 82,249. D. sends one member to parliament. The living is a vicarage in the gift of the earl of Dudley, and valued at £1000 per annum.

DUDLEY, BENJAMIN WINSLOW, LL.D., 1785–1870; b. Va.; a surgeon, educated in Transylvania and Pennsylvania universities; studied in Europe, and settled in Lexington, Ky. His specialty was lithotomy, or removing stone from the bladder, of which his recorded operations numbered 225, with 6 deaths. He also successfully used ligatures on the carotid artery for aneurism in the skull. He was professor of surgery in the medical school of Transylvania university, which he organized, and which was long the leading medical school in the west; and author of a number of valuable papers.

DUDLEY, CHARLES EDWARD, 1780–1841; a native of England; came to America in 1794; in 1809, married into the Bleecker family of New York, and settled in 1811 at Albany. He was successively state senator, mayor of the city, and U. S. senator to fill the unexpired term of Martin Van Buren, whom Jackson had sent as minister to England. He was greatly interested in astronomical science, and after his death his widow gave $70,000 for the erection of the observatory at Albany, which bears his name.

DUDLEY, JOSEPH, 1647–1720; b. Mass.; son of Thomas, and also governor of the colony. He studied theology, but went into political life, and from 1677 to 1681, was one of the commissioners of the united colonies. He was at the battle with the Narragansetts in 1675, and one of the commissioners to make peace with that tribe. James II. made him president of New England in 1685; two years later, he was appointed chief-justice, and was arrested as one of the friends of Andros, with whom he was sent to England. In 1690, he was made chief-justice of New York. In 1693, he went to England, and in 1701, was elected to parliament. From 1702 to 1715, he was governor of Massachusetts colony. It is recorded that he was a philosopher, a scholar, a divine, and a lawyer, all combined.

DUDLEY, PAUL, 1675–1751; son of Joseph; graduate of Harvard; studied law in London; was commissioned attorney-general of Massachusetts in 1702, promoted to the bench in 1718, and made chief-justice in 1745. He was a member of the legislature, a learned naturalist, and a member of the royal society. He left a legacy to Harvard to establish a yearly lecture in defense of Christianity; and published a number of works, among them one against the church of Rome.

DUDLEY, THOMAS, 1576–1652; a native of England, who came to Massachusetts in 1630 as deputy-governor, and was governor from 1634 to 1640, and again from 1645 to 1650. He had been an officer of the British force in Holland, and retrieved the fortunes of the earl of Lincoln by judicious management of his estates. He was a bold and somewhat intolerant man, but an efficient officer. He died at Roxbury, leaving a large estate. Simon Bradstreet was his son-in-law.

DUDLEY LIMESTONE, a highly fossiliferous Silurian limestone belonging to the Wenlock series (q.v.), which forms some of the most picturesque eminences around the town of Dudley. The masses of corals, shells, and trilobites which abound in this rock, form, when weathered, extremely beautiful cabinet specimens.

DUDLEY LOCUST, the popular name for a trilobite (*calymena Blumenbachii*, q.v.) which is very abundant in the Dudley limestone.

DUEL (Fr. *duel*, Lat. *duellum* or *dvellum*, which, as Cicero remarks [*Orat.* 45], was the old form of *bellum*, war), a combat between two persons, at a time and place indicated in the challenge, cartel, or defiance borne by one party to the other. A D. generally takes place in the presence of witnesses, called seconds, who regulate the mode of fighting, place the weapons in the hands of the combatants, and enforce compliance with the rules which they have laid down.

No trace of the D., as an institution, is to be found in the history of the classical nations of antiquity, the Latin word from which ours is derived having been used to signify a war between two nations. So long as men continued to be barbarians, their personal quarrels were no doubt decided in the ancient, as national quarrels still are in the modern world, by an appeal to physical force. But though war has been in all times the practical solution of strife, it was not till the middle ages that it came to be regarded as a means, in any sense judicial, of settling disputes. Hitherto, it had determined who was able to prevail, justice being set aside, but it was a new view that it would determine who ought to prevail on the principles of justice. The rationale of the *judicial combat* or wager of battle was probably two-fold. On the one hand, and generally amongst the people, it depended on a belief that God would interfere directly and miraculously in the conflict to protect the innocent, and to punish the guilty, and that thus the weakest combatant who had God on his side would prove more than a match for the strongest, when destitute of His aid. But there was a view of the matter which was not so directly superstitious, and which rested rather on a confusion between the principle of the original constitution and the principle of the transmission of rights. All human rights originate in the powers and faculties which God has given to man, and it was supposed that as the right originated in power, its continued existence in

the individual could be ascertained by ascertaining whether the power still existed in him. The error consisted, as we have said, in confounding the principle of the constitution with the principle of the transmission of rights. If a field which was claimed by two competitors had as yet been appropriated to nobody, or had been abandoned, and was, as lawyers say, *res nullius*, the fact of which of the two claimants ought to become the possessor, might be ascertained by judicial combat. But if it was already the property of one of them on a title which was to be held sacred, and the question was which of the two had this sacred title, that fact could never be determined by ascertaining which would have been in a condition to constitute it for the first time, had it been non-existent. The principle of the private D., in so far as it had any principle at all, and was not merely a piece of barbarous and irrational foppery, was precisely the same as that of the judicial combat. But the latter had been applied to a class of cases which admitted of legal investigation and decision, and it was consequently abandoned in the days of Queen Elizabeth; whereas the former was supposed to be a means of redressing wrongs which hardly can come within the cognizance of a human tribunal, and the consequence was that it continued in green observance in this country until recently, and is still in vigor in many continental countries.

Like the other peculiarities of mediæval life, the D. probably originated with the Germanic nations. It is said to have been introduced into legal proceedings in lieu of an oath by Gundebald, king of the Burgundians, in 501. Louis le Débonnaire was the first of the French kings who permitted litigants to appeal to arms. The practice was prohibited by Henry II., in consequence of a noted D. which took place in his presence between his friend, Francis de la Chastaignerie, and Guy Chabot de Jarnac, in which the latter was slain. The royal edict, however, was totally ineffectual, and the practice of private dueling has generally prevailed more extensively in France than in any other country. Francis I. patronized it by declaring that a lie could be borne without satisfaction only by a base-born churl, and still more by the example which he set in challenging his own great rival Charles V. In 1589, the parliament of Paris declared all persons who were either principals or seconds in D. to be rebels to the king. But its efforts were unavailing; and it is said that during the first 18 years of Henry IV., no fewer than 4,000 gentlemen perished in this foolish manner. In 1609, Henry added to the existing penalties, introducing even punishment by death in extreme cases. But these regulations were forced upon him by popular feeling; he had himself no aversion to the practice, and when he gave permission to Crequi to fight Don Philip of Savoy, he added: "If I were not the king, I would be your second." The consequence of this feeling was, that he readily granted pardons to those who had violated the laws which he had been forced to enact, and these laws not unnaturally produced an effect the very reverse of their ostensible object. Dueling acquired the charm of what the French call "forbidden fruit," and thus became a fashionable and favorite vice. In the reign of Louis XIII., the custom was so prevalent, that lord Herbert, the English ambassador, wrote home to his court that there was scarcely a Frenchman worth looking on who had not killed his man. It would not seem, however, that it was from negligence in enforcing the royal edicts that dueling then reached to so alarming a height; for it was during this reign that two noblemen, the greatest duelists of the day, the count de Boutteville and the marquis de Beuron, were tried and beheaded for persisting to fight. In the commencement of the reign of Louis XIV., D. with four or five a side began to be fought; and two very sanguinary affairs of this description having taken place, in which several persons of the highest rank were slain, the king determined to put an end to the practice. He published an edict in 1679, forbidding it under the highest penalties, which, unlike most of his predecessors, he had the firmness to inflict; and this measure, together with a solemn agreement which was entered into amongst the nobility themselves, led at that time to its almost total abolition.

The D. does not seem to have existed in Egland in Anglo-Saxon times, and was probably introduced at the conquest. In its judicial form, it was not entirely obsolete in the reign of queen Elizabeth; and sir Henry Spelman gives an account of a trial by battle, which terminated, however, without actual combat, in the year 1571. See BATTLE, TRIAL BY. Private dueling was common, however, both in Elizabeth's reign and in that of her successor, by whom a severe statute against it was enacted in Scotland (1600, c. 12). During the civil wars, men's minds were too much occupied with questions of grave importance to leave time for questions of etiquette, and the D. consequently declined; but it became exceedingly prevalent during the dissolute reign of Charles II. Some attempts were made to suppress it in the reign of William III., both in England and Scotland, and, in 1712, the subject was recommended to the attention of parliament in the queen's speech. But the bill which was brought in by the government was thrown out, and the practice continued to prevail. When the custom of wearing the sword was abandoned, the number of duels diminished, though it was then that their irrational character may be said to have attained its maximum. The pistol was substituted for the sword, and the doctrine of chance—which was reduced to an absurdity by the medical D. of a couple of pills, one composed of bread and the other of poison—was inaugurated. Since this period, the practice has fallen into disrepute, by the gradual operation of public opinion, and in this country it may probably be now regarded as finally abolished. By the law of this country, the act of killing in a D. has always been

regarded as murder, however fair the D. may have been; but whilst the practice was countenanced by public opinion, it was generally found impossible to induce a jury to convict. That a verdict of acquittal could not be looked for with the same security in the present day, is probably a pretty good guarantee for the practice not again making its appearance even in exceptional instances. In France it still prevails to a certain extent.

The duels of the students at the German universities, of which so much has been said and written in this country, are nothing more than fencing-matches with sharp weapons. They are foolish, but not deadly affairs, as the seconds, who are also armed, always interfere to prevent serious bloodshed.

In 1844, several new articles of war were issued by the commander of the forces, with a view to the abatement of dueling in the army.

1. Every officer who shall send a challenge, or who shall accept a challenge to fight a D. with another officer, or who, being privy to an intention to fight a D., shall not take active measures to prevent such D., or who shall upbraid another for refusing or not giving a challenge, or who shall reject or advise the rejection of a reasonable proposition made for the honorable adjustment of a difference, shall be liable, if convicted before a general court-martial, to be cashiered, or suffer such other punishment as the court may award.

2. In the event of an officer being brought to a court-martial for having acted as a second in a D., if it appear that such officer exerted himself strenuously to bring about an honorable adjustment of the difference, but failed through the unwillingness of the adverse parties, then such officer is to suffer such punishment as the court shall award.

3. Approbation is expressed of the conduct of those who, having had the misfortune to give offense to, or injure or insult others, shall frankly explain, apologize, or offer redress for the same, or who, having received offense, shall cordially accept frank explanations or apologies for the same; or, if such apologies are refused to be made or accepted, shall submit the matter to the commanding officer; and, lastly, all officers and soldiers are acquitted of disgrace or disadvantage, who, being willing to make or accept such redress, refuse to accept challenges, as they will only have acted as is suitable to the character of honorable men, and have done their duty as good soldiers who subject themselves to discipline.

Partly in consequence of these regulations, but still more as a result of the increasing reason and humanity of English society, the practice of dueling has become almost as entirely obsolete in the British army as it has in the country generally. See ORDEAL.

DUEL (*ante*). In the southern portion of the United States the custom of dueling, though of late years falling into disuse, is a recognized institution of society. Half a century ago the pistol and the bowie-knife were as much a part of a man's equipage as his hat or his boots. A gentleman of good social position who had not fought at least one duel was often looked upon as deficient in the qualities proper to his station. Sudden affrays in the streets, stealthy assassinations, and bitter family feuds, were the consequences. These feuds rivaled in duration and ferocity the Venetian vendetta. The land was full of swaggering bullies who had, metaphorically, in one hand a pack of cards and in the other a pistol. Modern civilization, and more especially the war of the rebellion, in which the southern states suffered so terribly, have greatly modified this fire-eating spirit. Other influences have assisted. Not only is the general voice against the practice, but in a large number of the states laws have been enacted which pronounce the killing of a fellow-being in a duel to be murder, and in still more states the mere sending of a challenge is a felony. The first duel on record in America was fought June 18, 1621, in New England, between two servants who fought with sword and dagger, and both were wounded. They were sentenced to have their heads and feet tied together, and lie 24 hours without meat or drink. In 1728, one young man killed another on Boston common in a night duel with swords. The survivor escaped from the country, and a severe law against dueling was enacted. During the revolution there were a number of duels. Charles Lee and John Laurens fought, and the former was wounded; Gwinnett, a signer of the declaration of independence was killed by gen. McIntosh. Gen. Greene was twice challenged, but refused to fight, and Washington approved his refusal. The most notable duel in the country's history was when Alexander Hamilton was slain by Aaron Burr. On that occasion a great man was lost to the nation, and a dangerous demagogue was socially and politically ruined. In the navy the duel in which Decatur was killed and Barron wounded holds the first place. Andrew Jackson killed a man named Dickinson, and was engaged in several other conflicts. Col. Benton killed Lucas, and also had other duels. Henry Clay and John Randolph, the two most brilliant men at that period in congress, fought in 1826. Jonathan Cilley, a member of congress from Maine, was killed by William J. Graves, a member from Kentucky, in 1838. Although himself a duelist, Jackson, while president, expelled officers from the navy for dueling. At the present time a person in the military or naval service implicated in a duel, either as principal or second, may be summarily cashiered. In the northern states the appeal to arms is seldom heard of, though by no means uncommon at the beginning of the century. De Witt Clinton fought with and wounded John Swartwout in 1802, and the next year challenged gen. Dayton of New

Jersey. One might suppose that journalism was a calling of any other than a warlike nature, but there have been several notable duels between editors. In 1804, James Cheetham, editor of the *American Citizen*, challenged William Coleman, editor of the New York *Evening Post*. The two did not fight, but there was a duel growing out of the challenge between Coleman and a harbor-master named Thompson, and the latter was supposed to have been killed. John D'Oley Burke, an Irishman, author of a drama called *Bunker Hill, or the Death of Warren*, and editor of a paper in New York, was killed in a duel in 1808. In 1846, Thomas Ritchie, jr., and John H. Pleasants, editors of the *Enquirer* and the *Whig* of Richmond, Va., met in a field, armed with swords and pistols, and had a desperate fight, in which Pleasants was killed, Ritchie being only slightly wounded. In 1842, James Watson Webb, editor of the New York *Courier and Enquirer*, fought with Thomas F. Marshall, a member of congress from Kentucky, and Webb was slightly wounded. The number of duels among editors in the southern states is very great. In some of the states the killing of a man in a duel is punishable with death; in others by imprisonment and forfeiture of political rights. In some states certain officers are required to swear that they have not been, within a certain period, and will not be, engaged in a duel.

DUENNA (feminine of "Don"), a woman in Spain, something more than a governess, and something less than an equal of the family, having charge of a gentleman's daughters, or being companion to the lady of the house.

DUER, JOHN, LL.D., 1782–1858; b. N. Y.; a distinguished jurist; son of William Duer, a revolutionary patriot whose wife was a daughter of William Alexander, claimant of the earldom of Stirling. Duer studied law, and from 1820 until his death was in practice in New York. In 1825, he was one of the commissioners to revise the laws of the state; in 1849, he was elected justice of the superior court, and in 1857, became chief-justice. He published *Duer's Reports*, works on marine insurance, and addresses before the New York historical society.

DUER, WILLIAM ALEXANDER, 1780–1858; b. New York; brother of John. Through his mother he was grandson of lord Stirling. He studied law, and about 1802 became a partner of Edward Livingston, in New Orleans. About 1812, he returned to New York, where from 1822 to 1829, he was a judge of the supreme court. In 1829, he was elected president of Columbia college. He published a *Treatise on the Constitutional Jurisprudence of the United States*.

DÜET, in music, a composition for two voices or instruments.

DUFAURE, JULES ARMAND STANISLAS, b. Saujon, France, 1798; studied law in Paris, and in 1834 was chosen deputy from Saintes, and regularly re-elected until 1848. He was councilor of state in 1836, and minister of public affairs in 1839. In 1844, he was chosen vice-president of the chamber, and after the revolution of 1848, was minister of the interior. Louis Napoleon gave him the same office, but after the *coup d'état* he returned to private life. In 1871, he was made minister of justice and vice-president of the council of ministers, but these offices were taken away in 1873.

DU FAY, CHARLES FRANÇOIS DE CISTERNAY, 1698–1739; b. Paris. He made important researches concerning the barometer, the nature of phosphorus, the refracting power of crystals, electricity, and the magnet. He spent many years in rearranging and improving the garden of plants in Paris.

DUFF, ALEXANDER, D.D., LL.D., who so thoroughly identified himself with the cause of Indian missions, was b. 25th April, 1806, at a farm near Pitlochry, in Perthshire. He studied at the university of St. Andrews with great success. In 1829, he resolved to go out to India as a missionary from the church of Scotland; and in Oct. of that year, having been previously ordained, he set sail from Portsmouth for India. On the passage out, he was wrecked on a barren island to the n. of the cape of Good Hope, and at length reached his destination after a disastrous voyage of eight months. At the disruption in 1843, the missionaries in India being obliged to declare with which party they would connect themselves, D. resolved to cast in his lot with the free church, and for 20 years carried on with great energy the missionary work at Calcutta under the auspices of that body. In the year 1837, he received the degree of D.D., in acknowledgment of his distinguished services. D. visited his native land twice after 1829, before returning altogether in 1863. He was moderator of the general assembly of the free church in 1851 and 1873, and was professor of evangelistic theology in the free church colleges. He took an important part in various philanthropic societies and schemes. Dr. D. was gifted with great fervor and extraordinary fluency as a speaker, and he wrote voluminously. Amongst his writings are, *New Era of the English Language and Literature* (1837); *Missions the Chief End of the Christian Church* (1839); *India and Indian Missions* (1839); *The Indian Rebellion, its Causes and Results* (1858). *The Calcutta Review* was mainly established by Dr. Duff. He died 12th Feb., 1878.

DUFFERIN, FREDERICK TEMPLE HAMILTON BLACKWOOD, Earl of, b. England, 1826; educated at Eton; succeeded his father in 1841 as fifth baron Dufferin and Clandeboye. He was for some years lord-in-waiting on the queen. During the Irish famine of 1846–47, he traveled in that country, and wrote an account of the wretchedness. In 1855, he was attached to the Austrian mission. In 1859, he made a yacht voyage to

Iceland, an account of which he published in *Letters from High Latitudes*. In 1860, he was sent as British commissioner to Syria to inquire into the massacre of Christians. In 1864, he was under-secretary of state for India, and in 1866, under-secretary of war. Gladstone, in 1868, made him chancellor of the duchy of Lancaster; and in 1872, he was appointed gov.gen. of the dominion of Canada, where he had great popularity. In 1876, he made a tour through British Columbia. In 1878, he was superseded by the marquis of Lorne, and was immedialely elected president of the royal geographical society. He was made an earl in 1871.

DUFOUR, Guillaume Henri, a Swiss gen., was b. at Constance in 1787, of a Genevese family. While Switzerland formed part of France, he studied at the Polytechnic school of Paris for two years; and on leaving it, he received an appointment as an officer of engineers in the French army. At the fall of Napoleon, he entered the Swiss service, and rapidly rose to the rank of col. When the government survey of Switzerland was undertaken, he was appointed director—at the same time acting as the principal of the Swiss military school at Thun. In 1840, he published *A Treatise on the Artillery of Ancient and Mediæval Times;* and in 1842, *A Manual of Military Tactics.* In 1847, he was raised to the rank of gen., and intrusted with the command of the army employed against the Sonderbund. He defeated their forces at Freiburg (13th Nov.) and at Lucerne (24th Nov.); and by his promptitude and skillful maneuvers, secured a triumph for the liberal party in time to prevent the interference of foreign powers, diplomatically or otherwise. The diet voted him a gift of 40,000 francs, and for a time he was the most popular man in Switzerland. His politics were not, however, those of the Genevese democrats, and in 1848 they deprived him of the public offices he had previously held. In 1856, he was again admitted to the council of Geneva, and sent on a special mission to Louis Napoleon *à propos* of the dispute between Switzerland and Prussia about Neufchatel (see Kern). In 1864, he acted as president of the conference held at Geneva relative to the treatment of the wounded in time of war. In 1869, he presided at a fête in celebration of the jubilee of the reunion of Geneva with Switzerland. He died in 1875.

DUFRESNE, Charles, Seigneur du Cange, hence generally styled merely Ducange, a French author, distinguished by his historical and linguistic writings, belonged to an ancient family of Picardy, and was born at Amiens, 18th Dec., 1610. After having received the rudiments of a scientific education at the Jesuits' college in his native town, he studied law at Orleans, and in 1631 became parliamentary advocate at Paris, where he continued to reside till his death, 23d Oct., 1688. There was scarcely any branch of science with which he was unacquainted, but his favorite studies were classical philology and history. Among his historical works may be mentioned the *Histoire de l'Empire de Constantinople sous les Empereurs François* (Paris, 1657). He also edited, along with other scholars, the *Corpus Historiæ Byzantinæ* (Paris, 1680), and Joinville's *Histoire de Saint Louis, Roi de France.* His two principal works, however, are the *Glossarium ad Scriptores Mediæ et Infimæ Latinitatis* (3 vols. fol., Paris, 1678; much enlarged by the Benedictines of St. Maur, 6 vols. fol., Paris, 1733–36, to which four supplementary volumes were afterwards added by Carpentier, a Benedictine), and the *Glossarium ad Scriptores Mediæ et Infimæ Græcitatis* (Paris, 1688). Both works display great learning, good judgment, and admirable industry, and are extremely valuable contributions to the study of the history and antiquities of the middle ages. A new edition of the Latin glossary, incorporating all the previous supplements, together with additions of his own, was published by G. A. Henschel (7 vols. 4to, Paris, 1842–53); and a supplementary volume (*Latino-Germanicum*) has since been added by Diefenbach (Francf. 1857). D. left a large quantity of valuable manuscripts, which have been collected in the university of Paris.

DUGDALE, Sir William, a celebrated antiquary and historian, was b. in 1605 at Shustoke, near Coleshill, Warwickshire. He was educated for some time at the free school of Coventry, but left it at the age of 15, and continued his studies under the care of his father, who, having a decided predilection for the branches of civil law and history, seems to have encouraged similar tastes in his son. His antiquarian pursuits led to his being created (1638) a pursuivant-at-arms extraordinary by the name of Blanche Lyon; and shortly afterwards, he was made rouge croix pursuivant-in-ordinary. During the civil war, D. adhered to the royal cause, and lived for several years in Oxford, employed in researches for his great works. On the restoration, D. was made norroy king of arms, and in 1677 garter king of arms; at the same time, the king, much against the wishes of D., whose estate was but a poor one, conferred upon him the honor of knighthood. He died at his estate of Blythe hall, Feb. 10, 1686. His chief works are *Monasticon Anglicanum* (Lond. 1655–61–73), (which, though for the most part written by another antiquary, named Dodsworth, was concluded, arranged, indexed, and corrected by D.); a new and greatly enlarged edition of the *Monasticon* by Bandinel, Caley, and Ellis, was published in 1817–30, and reissued in 1846; *The Antiquities of Warwickshire* (1656; second edition revised and continued, 1730); *The Baronage of England* (1675–76); *Origines Juridicales, or Historical Memoirs of the English Laws,* etc. (1666; third edit. 1680); *Short View of the Late Troubles in England* (Oxford, 1681); *The Ancient Usage in Bearing Arms* (1682; new edition, 1811). D. bequeathed upwards of

27 folio MS. volumes, written in his own hand, to the university of Oxford. They are now in the Bodleian library, the Heralds' college, and the Ashmolean museum.

DUGONG', *Halicore*, a genus of mammalia, of the family *manatidæ* (q.v.), or herbivorous cetacea, distinguished by molar teeth with flat summits, and composed of two cones laterally united, the incisors of the upper jaw elongated almost into tusks; the tail forked or crescent-shaped; and the swimming paws destitute of any vestiges of nails. One species alone has been thoroughly ascertained and accurately described. The D. (*H. indicus*, or *H. dugong*) of the Indian archipelago is said to attain a length of 20 ft. when full grown, although it is more frequently seen of only 8 to 12 ft. long. In general form, it much resembles the manatee. The skull is remarkable for the sudden bending downwards of the upper jaw almost at a right angle. The upper lip is large, thick, and fleshy, covering the prominent incisors, and forming a kind of snout, "something like the trunk of the elephant cut short across." The eyes are very small, and are furnished with a third eyelid or *nictitating membrane*. The skin is smooth and thick, but yields no oil. The anatomy of the D. has been very carefully examined. It exhibits a very remarkable peculiarity, in the ventricles of the heart being completely detached from one another. Its osteology has been found to exhibit interesting points of correspondence with that of the *pachydermata*, as in the numerous ribs, etc.; its dentition resembles in some particulars that of the elephant; its digestive apparatus is adapted to vegetable food, differing very much from that of the whales, dolphins, and other ordinary cetaceans. It feeds on the algæ which grow on submarine rocks in shallow seas. Its lips are of much use in gathering together its food. It often comes to the surface to breathe, and is said to utter a peculiar cry. It is gregarious. The female produces one young one at a birth, and shows an affection for it which is proverbial among the Malays. When the young one is taken, the mother is easily secured. The D. is generally pursued in boats, and killed by spearing. The flesh is highly esteemed even by Europeans, and is described as resembling young beef. That of full-grown animals is, however, comparatively coarse, on which account, and the greater facility of capture, the younger ones are more frequently killed. According to Rüppell, it was with the skin of the D. of the Red sea that the Jews were directed to veil the tabernacle.

DUGUAY TROUIN, RENÉ, one of the most celebrated naval officers of France, was b. 10th June, 1673, at St. Malo, left the school at Caen, where he was to have studied theology, with the reputation of a good-for-nothing fellow, and betook himself to the sea. His career, which was very brilliant, may be divided into two parts, the first extending from 1689 to 1697, and the second from 1697 to the close of his life. During the former, he cruised about as a sort of privateer, inflicting immense damage on the enemies of France. The English merchantmen suffered severely from his attacks. In the channel, on the coasts of Ireland and Holland, in the Spanish Main, everywhere fortune followed Duguay. Louis XIV., as a reward for his daring exploits, admitted him into the state navy, and gave him the command of a frigate. The second part of his career was as brilliant as the first. In 1707, he engaged a part of the English fleet at the entrance of the channel, burned 1 ship, captured 3 others and about 60 transports; but the most glorious of his triumphs was the attack and capture of Rio Janeiro in 1711, after hostilities had lasted for 11 days. The city was ransomed for 610,000 cruzades. The South American expedition of D. T., which cost Portugal in all about 30,000,000 francs, put the seal to the celebrity of the French commander. He was successively named *chef d'escadre*, member of the council of the Indies, lieut.gen., and naval commandant at Brest. In 1731, Louis XV. sent D. T. into the Levant, to chastise the barbarians inhabiting the neighboring coasts, and to obtain reparation for the damages done to French commerce. In this also D. T. was successful. He died 27th Sept., 1736. His *Mémoires* were published by Beauchamps (4 vols., Paris, 1740).

DU GUESCLIN, BERTRAND, 1314–80; constable of France, and the most famous French soldier of the age. He was so remarkable for ugliness, when a child, as to be an object of aversion to his parents. He gained his first reputation as a soldier in 1338 at a tournament to celebrate the marriage of Charles of Blois with Jeanne de Penthièvre, at which he unseated all the famous competitors. Becoming a soldier of fortune under Charles, he gained great distinction at the siege of Vannes in 1342. He was knighted, and in 1351 went, with the lords of Brittany, to England to secure the release of his captive master. He gallantly relieved Rennes, besieged by the duke of Lancaster in 1356, and by his help the city held out till the truce of Bordeaux in June, 1357. He soon took service under the French king, and, after several brilliant actions, was made marshal of Normandy and count of Longueville. At the battle of Auray, in 1364, he was taken prisoner, but he was ransomed for 100,000 crowns; and becoming commander of the grand companies, led them into Spain, where he placed Henry of Trastamare on the throne of Castile in 1366. In the next year he was taken prisoner by the Black Prince, then in alliance with Pedro the cruel. Being again ransomed, he again restored Henry to the throne in 1369. In 1370, he was made constable of France, and for ten years was active and successful in driving the English from the s. and w. of France. In 1373, he seized and held the duchy of Brittany. He died while besieging the fortress of Châteauneuf-Randon. The garrison had already agreed to capitulate, and their commander led them out, and placed the keys of the castle upon the coffin of the constable.

DUHAMEL DU MONCEAU, HENRI LOUIS, 1700-82; a French botanist. For discovering the disease which was destroying the saffron plant (a parasitical fungus attacking the roots), he was made a member of the academy of sciences. Alone, and with Buffon, he made many experiments in vegetable and animal physiology, and the influence of the weather on agricultural production. Late in life he was appointed inspector-general of marine.

DUI'DA, a mountain of Venezuela, in South America, stands in lat. 3° 30′ n., and long. 66° 10′ west. It is of conspicuous form, being perpendicular on two sides, and bare at the summit. Rising, moreover, to the height of 8,500 ft., it forms a safe landmark for the voyager on the Orinoco.

DUIL'LIAN COL'UMN, erected in the forum at Rome in honor of the naval victory of C. Duillius. The name *rostratæ* was given to columns commemorating naval victories (from *rostra* the beak of a ship), as they had on each side projections in the form of such beaks. Michael Angelo restored this column, and his restoration is in the Palazzo de' Conservatori, on the Capitoline hill. Its pedestal retains a portion of the original inscription.

DUISBURG, a t. of Rhenish Prussia, about 15 m. n. of Düsseldorf, is situated in a fertile district, between the Ruhr and the Rhine, with both of which it is connected by a canal. It is surrounded partly by walls, flanked with towers, which are now somewhat decayed, and partly by a rampart and ditches. D. contains a gymnasium founded in 1599, a monastery of Minorites, and five churches, two of which—that of St. John the Baptist, dating from 1187, and St. Salvador's, are worthy of notice. Its manufactures are numerous and important; including tobacco, soda, sulphuric acid, and other chemicals, iron castings, soap, starch, and sugar; there is also a large trade in wine and colonial produce. In the neighborhood are iron-works and coal-mines. Pop. '75, 37,371. D. is an ancient town. In the 13th c., it was a member of the Hanseatic league, and afterwards a free town of the German empire, but at the close of the war in 1815 it was handed over to Prussia.

DUJARDIN, FELIX, 1801-60; b. Tours, France; studied mathematics and geology, but was induced by Dutrochet to turn his attention to zoology. His specialty was *Infusoria*, concerning which he arrived at conclusions different from those of Ehrenberg. He was professor at Toulouse and at Rennes, and wrote a number of works on his favorite subjects.

DUKE (Fr. *duc*, Lat. *dux*, from *ducere*, to lead), a term applied originally to any military leader. Gibbon informs us that the title came first into use when Constantine separated the civil and the military commands in the provinces, which had been exercised in common by such men as Agricola. From that time forth, the military governors of provinces were either counts or dukes. But these titles originally stood to each other in an opposite relation to that which they afterwards assumed. "It should be recollected," says Gibbon (iii. 57, cap. xvii.), "that the second of these appellations—that of D.—is only a corruption of the Latin word, which was indiscriminately applied to any military chief. All provincial generals were therefore *dukes*, but no more than ten among them were dignified with the rank of *counts*, or companions, a title of honor, or rather of favor, which had been recently invented in the court of Constantine." See COUNT. "A gold belt," continues Gibbon, "was the ensign which distinguished the office of the counts and dukes; and, besides their pay, they received a liberal allowance, sufficient to maintain 190 servants and 158 horses. They were strictly prohibited from interfering in any matter which related to the administration of justice or the revenue; and the command which they exercised over the troops of their department, was independent of the authority of the magistrates." When the Goths, and Franks, and other barbarians successfully invaded the provinces of the empire, they preserved the titles of count and D., if they had not already borrowed them from the Romans. But amongst races who owed their supremacy to the sword, no dignity could prevail over that of the commander of an army; and the dukes, as military chiefs, acquired a marked pre-eminence over the counts, whose lofty functions under the empire had been partly of a civil, and partly of a military nature. The only exception under the first Merovingians was in the case of the count of the palace. See COUNT. In the hierarchy observed by the Franks and other Teutonic races, the ordinary count became the lieut. of the D., and the government of the latter extended to several provinces; whereas that of the former was confined to one province, or even to a single locality. The power of the dukes grew so rapidly, in consequence of the dissensions of the Merovingians, that, towards the end of the 6th c. (582), they arrogated to themselves the right to dispose of the crown. Amongst the causes which tended to raise the power of the dukes, was the immense wealth which had been acquired by the great provincial families. The chiefs who had attached themselves to the fortunes of Clovis had been richly endowed with conquered lands. After the close of the 7th c., they overshadowed the crown, and the title of prince and chief (*chef*) began to be attributed to them. It has been said that the *ducs-maires* of the palace sometimes assumed the title of archduke (q.v.). Under the second dynasty, the title of duke retained all its dignity and importance, and it was to the successive invasions of local upon central power, that feudality owed its origin.

The concession, tacit or express, of hereditary power and independent jurisdiction, first to the central province known as the Isle of France, and then to Aquitaine, extended itself, under the Carlovingians, to Burgundy, Normandy, and Gascony; and on the accession of Hugo Capet, to all the other subaltern tenures. Once become unlimited masters of their respective legations, the dukes did not long delay to proclaim their title to be as good as that of the king. They assumed the crown and the scepter, promulgated laws for their subjects, struck money with their own image, and made war in their own name against the crown, with whom they balanced and several times divided the supreme authority. The confederation of the feudal lords had assumed such dimensions, that about the period of the Norman invasion of England nothing remained directly under the crown except a few towns, of which Rheims and Laon were the chief. The rest of the kingdom was divided amongst the dukes and the counts, under an obligation, which they almost always evaded, of service and fidelity to the crown. But the Capetiens had been enlightened by the fall of two dynasties, and were careful to delegate to no other hands the duchy of the Isle of France, which had so often been a stepping stone to the throne. When it became extinct in 887, it was not re-established, and that event was the signal for the restoration of a national character to France. The duchy of Gascony was joined to Aquitaine in 1052; and both provinces, along with Normandy, were finally re-united to the crown, in 1204, by confiscation. This latter duchy was sometimes given to princes of the blood, but without any separation of its fiscal arrangements from those of the kingdom. A part of Aquitaine was given up to England in 1259, and again ceded to France in 1453. The ducal sovereignty of Burgundy was extinguished in 1477, that of Brittany in 1514, of Narbonne in 1229, and of Toulouse in 1361.

The duchies which were subsequently granted to members of the royal family—that of Bourbon, erected in 1327; of Orleans, in 1344; of Auvergne, Berri, Touraine, Valois, and Alençon, at subsequent periods—enjoyed none of the privileges of independent sovereignty which had belonged to the ancient duchies. The subordination of these fiefs was absolute, and the princes who governed them, though placed on the steps of the throne, were only the first subjects of the realm. The tendency to diminish the actual power which anciently had attached to the ducal title, was still more apparent in the case of those dukedoms which were conferred on the representatives of illustrious noble families. The Montmorencies were created dukes in 1551, but they enjoyed no other privileges than those of titled nobles, and their position had no analogy whatever to that of the old provincial dukes. The duke-peers, as they were called, were simply the first class of nobles in France, just as dukes are with us in England; but they differed from English dukes, in that, after the extinction of the Comté pairie d'Eu, in 1775, the duke-peers alone sat in parliament. Several prelates enjoyed this rank—as, for example, the archbishop-duke of Rheims, the bishop-duke of Laon, and the bishop-duke of Langres. The archbishop of Paris took the same rank after the erection of St. Cloud into a ducal peerage in 1674. There were still two other sorts of dukes in France—the dukes who were not hereditary peers, and the dukes for life, or patent dukes, who date only from the reign of Louis XIV. Swept away by the revolution, the title was restored by Napoleon, who conferred it, with rich endowments, on his marshals. Several ducal peers were created by Louis XVIII. and Charles X.

In Germany, the dukedom passed through phases very similar to those which it exhibited in the earlier history of France. What is special to the position of the nobility of that country, will be stated under GRAF (q.v.).

Dukes, in the older European sense, do not appear ever to have existed in England. The title seems not to have been known earlier than the reign of Edward III., and from the first it was a mere honorary distinction. The Black Prince, who was created D. of Cornwall (see below) in 1335, was the first English duke. In 1350, Henry, the king's cousin, was created D. of Lancaster; and when he died, and his daughter was married to John of Gaunt, the king's son, the title was transferred to him—his elder brother, Lionel, being make D. of Clarence. In the succeeding reign—that of Richard II.—the two younger sons of Edward III. were created, the one D. of York, and the other D. of Gloucester. The dignity was thus, in the first instance, confined to the royal house. But the families of Holland and Mowbray very soon received the same title; and one of the Beauforts, an illegitimate son of John of Gaunt, was raised to the peerage by the title of D. of Exeter. In the reign of Henry VI., the title was granted more widely, and there were at one time ten duchesses in his court. The Staffords, Beauchamps, and De la Poles, belong to this period. King Henry VIII. created only two dukes—the one was his illegitimate son, whom he made D. of Richmond; and the other Charles Brandon, who married his sister, the French queen, and was made D. of Suffolk. Queen Elizabeth found only one D. when she came to the throne—Thomas Howard, D. of Norfolk—attainder or failure of male issue having extinguished the rest of them. After the attainder and execution of the D. of Norfolk, there was no D. in England, except the king's sons, till Ludovic Stuart, a relative of the king's, was made D. of Richmond in 1623. In 1623, Villiers was made D. of Buckingham. On the restoration, Charles II. restored the Seymours to the rank of dukes of Somerset, and created Monk D. of Albemarle. But the habit of conferring this dignity on the illegitimate sons of

the monarch was still adhered to, as in the case of the D. of Monmouth, who was the illegitimate son of Charles II.; and the D. of Berwick, of James II. Of the existing dukes besides the descendants of Charles II., there are only three families which date their dukedoms before the revolution—viz., the Howards, the Seymours, and the Somersets. It was William and Anne who, by advancing a very considerable number of the first families of peers to the rank of D., altogether changed its character. There are now 11 English dukes, 7 Scotch, 5 of Great Britain, 6 of the United Kingdom, and 2 Irish. These numbers do not include dukes of the blood-royal.

The DUCAL CORONET is composed of a circle of gold, with eight strawberry or parsley leaves, of equal height above the rim.

DUKE OF CORNWALL. The duchy of Cornwall was by royal charter of Edward III. conferred on his son Edward the black prince. King Henry IV. subsequently included the D. of C. in a patent in favor of his son Henry prince of Wales. But since that time, the duchy has belonged of right, without any special grant, to the king's heir-apparent from the time of his birth. On the death of the king's eldest son without issue, during the life of his father, the duchy descends to the next brother. In the event of the death of the heir-apparent without issue, and without leaving a younger brother, or in case the heir-apparent succeeding to the crown, the duchy of Cornwall merges in the crown until the birth of a son calls it again into existence. The uncertainty thus arising in regard to the duchy has produced much confusion in regard to leases held of the D., and various acts of parliament have been passed, from the 21 James I. to the reign of the present queen, to regulate this matter. The D. of C. formerly possessed "royal jurisdiction and crown rights, giving liberty to send burgesses to parliament, and appointing the sheriffs, admirals, and other officers."—Carew's *Cornwall*. At the present day, there is a separate chancellor, and attorney and solicitor general for the D. of Cornwall. The revenues of the duchy are considerable, arising partly from the rents, etc., of the different manors, and partly from the dues on tin, which is produced in large quantities from the Cornish mines. There is a special court for the settlement of questions arising among the miners, called the stannaries court (q.v.).

DUKE OF EXETER'S DAUGHTER, an instrument of torture resembling a rack, said to have been invented by the dukes of Exeter and Suffolk during the reign of Henry VI. This curious instrument was for some time preserved in the tower of London. Blackstone avers that it was never put into use.—*Blackstone*, iv. 326.

DUKES, a co. of s.e. Massachusetts, consisting wholly of islands in the Atlantic ocean; in all, about 118 sq.m.; pop. '70, 3,787. Martha's Vineyard is the largest island, and is about 5 m. from the mainland. There is some agriculture, but the chief business is fishing and commerce. Co. seat, Edgartown.

DUKE OF YORK'S SCHOOL is the popular designation for the *Royal Military Asylum* at Chelsea. In the French army, there have long been *enfans de troupe* borne on the books of each company or battalion of soldiers; that is, children of deceased soldiers, unprovided with other homes. In England, no such system prevails. The late duke of York, in the year 1801, used his influence to obtain the formation of a soldiers' orphan asylum. Accommodation was obtained at Chelsea; and in 1803, schools were opened for 700 boys and 300 girls, children of deceased soldiers. The institution has been kept up ever since for the boys, of whom 500 are now maintained, but was a failure as to the girls. The boys are wholly supported as well as educated. They are not bound to serve the state after they leave the asylum; but most of them nevertheless enter the army. A soldier's son has not a *right* of admission; a selection is made according as vacancies may occur. When the boys leave the school, those who do not enter the army are apprenticed to trades. The asylum is under a board of commissioners, who make the necessary rules and regulations. The chief officers are the commandant, secretary, quartermaster, head-master, chaplain, surgeon, and dispenser.

The expenses are defrayed by an annual parliamentary grant, included in the army estimates.

No provision is now made by the state for the *daughters* of deceased soldiers. The girls admitted into the asylum in the early years of its history, brought discredit to it by their after-life; and this part of the system was abandoned. There is only a royal patriotic fund asylum on Wandsworth Common, unaided by the state, for soldiers' orphan daughters; it originated during the Crimean war.

DU'KINFIELD, a township in the n.e. of Cheshire, 42 m. from Chester, and separated from Ashton-under-Line in Lancashire by the Tame. It has large cotton-factories, iron-foundries, fire-brick and tile-works, and collieries. Astley's new pit in this township, 690 yards in depth, is one of the deepest coal-mines in the world. Pop. '71, 14,085.

DULCAMA'RA, the young branches of bitter-sweet or woody night-shade (*solanum dulcamara*), a perennial plant of the order solanacèæ. The dried branches, sold by the druggists, contain an alkaloid, solanine, besides a sweet and bitter principle, dulcamarine or picroglycion, and other matters. It is feebly narcotic, with power to increase the secretions, particularly of the kidneys and skin. It sometimes produces a dark purple color of the face and hands, with languid circulation of the blood. Over-

doses produce nausea, vomiting, faintness, vertigo, and convulsive muscular movements. It is used in skin diseases, particularly those of a scaly character, as lepra and psoriasis, when it is often combined with antimonials; and has been used in chronic rheumatism and catarrh, also in some forms of mania. It is usually given in the form of a decoction, but there is an officinal inspissated and a fluid extract.

DULCE, a gulf in Costa Rica, on the Pacific coast, 8° 3′ n., 83° 53′ west. It extends over about 800 sq.m. and is fed by a small river of the same name.

DULCE, a lake in e. Guatemala, near Honduras, about 30 m. by 12, and from 30 to 60 ft. in depth. Its waters empty into a smaller and shallower lake called the Golfete, and thence reach the sea through the Rio Dulce, a narrow strait running between high hills. A bar at the mouth of this strait prevents the entrance of vessels requiring more than 6 ft. of water.

DULCIG'NO, a t. and seaport of European Turkey, province of Albania, is situated on the shore of the Adriatic, 15 m. s.s.w. of Scutari. The inhabitants were long notorious for piracy, but are now more creditably engaged in the oil and coasting trade. D. is the seat of a Catholic bishop. Pop. about 7,000.

DULCIMER, a musical instrument resembling a flat box, with sounding-board and bridges, strung with thin wire, and played on by striking the wires with a small piece of wood in each hand.

DULCOSE, or DULCINE, is a substance closely allied to manna-sugar or mannite, and imported from Madagascar. It consists of $C_6H_7O_6$, or $C_{12}H_{14}O_{12}$, is insoluble in boiling alcohol, and does not undergo fermentation.

DULONG, PIERRE LOUIS, 1785–1838; b. Rouen, France. His attention was given chiefly to natural sciences, and he made many valuable and some dangerous experiments in chemistry, losing a finger and an eye in his search for knowledge. He investigated the phenomena of animal heat, in company with Berzelius and Berthollet. With Arago he studied several years the elastic power of steam at different temperatures, trying to find preventives of steam-boiler explosions.

DULSE, *Rhodomenia palmata*, a sea-weed, one of the ceramiaceæ (q.v.), growing on rocks in the sea, and used as food by the poor on the coasts of Scotland, Ireland, and other northern countries, and of the Grecian archipelago, occasionally also as a luxury by some of the wealthier classes who have acquired a taste for it. It has a purple, leathery, or somewhat membranous, veinless, sessile frond, irregularly cut, with repeatedly forked segments, which are either entire at the edges, or furnished with lateral leaflets, the spores distributed in cloud-like spots over the whole frond. Its smell somewhat resembles that of violets. It is eaten raw or roasted, and with vinegar. In Iceland, it is sometimes boiled in milk. It is an important plant to the Icelanders, and after being washed and dried, is stored in casks, to be eaten with fish. In Kamtchatka, a fermented liquor is made from it. It is extremely common on all parts of the British coasts. Sheep are fond of it, and seek it eagerly at low water.—The cry "Dulse and tangle" was once common in Edinburgh.—The name D. is also given in the s.w. of England to another sea-weed, *iridæa edulis*, also one of the *ceramiaceæ*, which has an undivided, obovate or wedge-shaped, flat, expanded frond, very succulent, tapering to a short stalk, and of a dull purple color. It is occasionaly employed as food both in the s.w. of England and in Scotland, and is either eaten raw or pinched between hot irons.—PEPPER DULSE, *Laurentia pinnatifida*, another of the *ceramiaceæ*, has a compressed cartilaginous frond, twice or thrice pinnatifid. It has a pungent taste, and is used as a condiment when other sea-weeds are eaten.

DULUTH, a city, the capital of St. Louis co., Minnesota, at the western extremity of lake Superior, 155 m. n.e. of St. Paul. It is the point of departure of the Northern Pacific railroad, and has connection through St. Paul with all the great railroad lines extending eastward and southward to every part of the United States. The harbor, formed by two points, one of them extending 7 m. into the lake, is well protected, and has been to some extent improved. A ship-canal, 250 ft. wide, cut across Minnesota point, gives ready access from the lake. The Northern Pacific railroad has built large and substantial docks for its own use, and there are besides several docks and piers constructed by the citizens for general traffic. The government has constructed a breakwater for the protection of the outer harbor. The city derives its name from capt. Jean Du Luth, a French officer and traveler who visited the region in 1760. No longer ago than 1869 the site was a wilderness; one year later it had a pop. of 3,131; pop. '75, 5,000. It has a dozen churches, a custom-house, a weather-signal office, a national bank, several newspapers, manufactories of stoves, carriages, and machinery, and is the center of a growing trade in wheat, flour, and other commodities.

DULWICH, a suburb of London, in the n.e. of Surrey, 4½ m. s.s.e. of St. Paul's cathedral, and near Sydenham. Pop. '71, 4,041. It is a fine rural spot, has many genteel residences, and is noted for its college and picture-gallery.

DULWICH COLLEGE, or God's gift, was founded in 1619 by Edward Alleyne, a tragic actor. It maintains 12 poor brethren, 12 poor sisters, 12 poor scholars, and 16 out-pensioners. The old college buildings occupy 3 sides of a quadrangle, and comprise the

chapel, chaplain's house, alms-rooms, and the lower school, in which 160 boys receive a second-grade education at the nominal fee of £1 per annum. The upper school, giving a first-grade education, was, in 1870, transferred to new buildings, erected at a cost of nearly £100,000. It can accommodate 700 scholars. The picture-gallery, of choice old Italian, Flemish, and other paintings, was left to the college in 1811, by sir F. Bourgeois, and is much visited. The expenses of this important institution are chiefly defrayed by the revenues of the manor of Dulwich, which consists of about 1400 acres, and produces about £17,000 per annum.

DUMANGAS, a t. near the sea-coast, in the province of Ilbilo, island of Panay, one of the Philippines. The vast plain of D. produces abundance of rice. Pop. of town, 25,000.

DUMAS, ALEXANDRE, a French novelist, was the son of the republican general, Alexandre Davy-Dumas, who was himself the offspring of the marquis Davy de la Pailleterie and a negress. The crisp hair and thick lips of D. bore testimony to his African origin, a testimony which is confirmed by the savage voluptuousness and barbaric taste of his partial innumerable compositions. D. was born at Villers-Cotterets, 24th July, 1803. His father died when he was quite a child, and he received in consequence a very imperfect education. At the age of 20, he came to Paris to seek his fortune, and after a short time received an appointment in the household of the duc d'Orleans. In 1826, he first appeared as an author in a volume of *Nouvelles;* but it was not till 1829, when his historical drama, *Henri III. et sa Cour*, was brought upon the stage, that France fairly mistook him for a genius. This work appeared at the time when *romanticism* was beginning to triumph over *classicism* in French poetic literature, and was hailed by the advocates of the former as a crowning victory. The duc d'Orleans, who was delighted with the production, led the applause, on the first night of its representation, in honor of the author. Next morning, D. was made librarian to his highness. From this period, he became more and more a noted character in Paris, dexterously contriving at once to feast the appetites of the mob, and to continue the companion of princes. In 1846, he accompanied the duc de Montpensier to Spain, as the historiographer of his marriage. Afterwards, he visited Africa: and on his return to Paris, finding his income inadequate to meet the expenses of his costly mode of life, he opened a theater of his own. The revolution induced him to attempt a political career; but France, in spite of its discreditable admiration of this literary Cagliostro, had sufficient good sense to turn the cold shoulder to him. In 1853, "financial considerations" compelled him to seek refuge in Belgium. Subsequently, his pecuniary star being once more in the ascendant, D. visited the east. After the conquest of Sicily by Garibaldi in 1860, he followed in the wake of the great liberator, who does not seem, however, to have been imposed upon by his mountebank worship and bombastic enthusiasm.

It would require pages to enumerate all the productions which have been issued under the name of D.; but for two reasons, this is unnecessary: first, they are for the most part worthless, and second, they are for the most part not *his*. M. Alphonse Karr, in his *Mercantilisme Litteraire* (1845), and M. Eugène de Mirecourt, in his *Fabrique de Romans, Maison A. Dumas et Cie* (1845), have exposed the astounding quackery of this writer. It would seem that D. had introduced the *sweating-system* into literature, for he had in his employment a large number of poor authors and literary hacks, whose circumstances or position hindered them from demanding a legitimate emolument for their labor. To these persons, D. was in the habit of giving a few brief outlines of a novel or drama, and then paid them for composing the work, which appeared as the production of D.'s miraculous pen. Thus it happened that D. sometimes contrived to issue more volumes in a year than it was possible for a human being to transcribe in the same period. His best known works are *Les Trois Mousquetaires* (8 vols., 1844), *Le Comte de Monte Cristo* (12 vols., 1841–45), *La Reine Margot* (6 vols., 1845). His *Mémoires,* commenced in 1852, only confirm the impression of his character which one derives from the perusal of his books. Altogether, it may be said that the appearance in literature of a writer like D. is a portentous phenomenon; and the avidity with which his immoral fictions are devoured, is the most severe condemnation of modern, and especially French, society that could well be pronounced. He died 5th Dec., 1870.—DUMAS, ALEXANDRE, or Dumas the younger, son of the preceding, who has unhappily followed in the footsteps of his father, was born at Paris, 28th July, 1824. His principal work is *La Dame aux Camélias* (2 vols., 1848), a novel on which is founded the notorious opera of *La Traviata.* It is perhaps the most audaciously immoral work in existence. The heroine is a prostitute, who, while following her avocation, contrives (in a manner known only to French novelists) to keep up an unsullied affection for a young gentleman, who is a compound of sentimentalism, imbecility, and lust. Among D.'s other works may be mentioned *Le Roman d'une Femme; La Dame aux Perles;* and several dramatic pieces. He was installed as a member of the French academy in 1875.

DUMAS, JEAN BAPTISTE, a distinguished French chemist, was b. at Alais, in the department of Gard, in 1800. He was at first apprentice to an apothecary in Geneva, and engaged in some scientific investigations that attracted the attention of Decandolle and Prévost. In 1821, he came to Paris, and was appointed chemical *répétiteur* (tutor) in the polytechnic school, and then professor of chemistry in the athenæum. He was

afterwards removed to the Sorbonne, and made a member of the institute. His researches in organic chemistry, on atomic weights, sulphuric ether, and the law of "substitutions," attracted attention over all Europe. D. is not merely an expert chemist, but an able and bold thinker, and eloquent expounder, who has the art of making science attractive, and of captivating his hearers. During the July monarchy, he was a member of the council of education. After the revolution of Feb., he was chosen a member of the legislative assembly; and from 1849 to 1851, he held the portfolio of agriculture and commerce. After the *coup d'état*, he was made a member of the senate and of the superior council of public instruction, of which he is at present vice-president. Numerous contributions from his pen are contained in the *Annales de l'Industrie* and other scientific journals, and in the *Mémoires de l'Académie*. His chief works are *Traité de Chimie appliquée aux Arts; Leçons sur la Philosophie Chimique; Essai sur la Statique Chimique des Êtres Organisés*, etc. D. delivered the first Faraday lecture before the London chemical society, in 1869. He was elected a member of the French academy in 1876.

DUMAS, MATTHIEU, Count, 1753–1837; a French soldier and military historian. He entered upon active service in the army in 1780 as aid to Rochambeau, commander of the French force sent to the aid of the Americans then in revolt against England. He was in a number of engagements, including the capture of Yorktown. After peace, he returned to France. In the revolution of 1789, he acted with Lafayette and the constitutional liberal party. In 1791, he was elected to the assembly, and the next year was chosen president of that body. During the reign of terror he absented himself from France, with some brief intervals. In 1797, he was proscribed as a monarchist, and fled to Holstein. When Bonaparte became first consul he was recalled, and appointed chief of staff to the army of Dijon. He was subsequently councilor of state, and grand officer of the legion of honor, whose organization he defended before the corps legislatif. He went with Joseph Bonaparte to Naples, and was made minister of war. In 1808–9, he served in the French army in Spain and Germany, and after the battle of Wagram he was employed in negotiating the armistice. He was intendant-general of the army in the Russian campaign, an office which involved the charge of the entire administrative department. He shared the horrors of the retreat from Moscow, took part in the battles of Lutzen and Brantzen, and after the defeat at Leipsic was employed to negotiate the capitulation; but his terms were not accepted by the allied powers, and he was arrested and imprisoned until the conclusion of peace in 1814. He was in favor under the temporary restoration, and held important commissions. When Napoleon returned from Elba, Dumas was intrusted with the organizing of the national guards. This put him out of favor with the Bourbons, and when Louis XVIII. was finally restored, he was obliged to retire on half-pay. He then finished his review of military events, in 19 vols., embracing the history of the war from 1798 to 1807. In 1818, he was restored to favor, and made a member of the council of state; in 1828, he was a deputy in the assembly from Paris. After the events of 1830, he was made a peer, and re-entered the council of state as president of the war committee.

DUMB. See DEAF AND DUMB.

DUMB AGUE, a common name, although not unscientific, of masked ague, or a form of intermittent fever, in which the prominent symptoms, as the shaking chill, and the succeeding violent fever, are not present, or the tendency to them only slightly indicated. It is sometimes applied, though erroneously, to a much more serious and dangerous form, called pernicious, malignant, or congestive intermittent fever. See INTERMITTENT FEVER.

DUMBARTON, a royal, parliamentary, and municipal burgh, seaport, and chief town of Dumbarton co., is situated mainly on the left bank of the Leven, near its junction with the Clyde, and 15 m. w.n.w. of Glasgow. It is rather closely built, and chiefly consists of a long semicircular street, parallel to the river. The chief branches of industry carried on in the town of D. are ship-building, marine-engine and machine making, iron-forging, iron and brass founding, and rope-making. It has regular steam-communication with Glasgow, Greenock, and other Clyde ports. Pop. '71, 11,404. It unites with Kilmarnock, Renfrew, Rutherglen, and Port Glasgow in sending one member to parliament. D. is supposed to have been the Roman station Theodosia, and the capital of the kingdom of the Britons, on the vale of the Clyde. Alexander II., in 1222, made it a royal burgh. To the e. of the alluvial plain, at the mouth of the Leven, stands the famous and picturesque castle of Dumbarton, on a steep, rugged, basaltic rock, rising to the height of 560 ft., a mile in circuit at the base, and forming nearly an island at high water. The rock almost hides the town of D. from the Clyde. The fortress, composed of houses and batteries, studded over the rock, is of considerable historical interest. The rock is accessible only at one part, which is fortified by a rampart. The castle has been often besieged. A huge two-handed sword, said to be that of Wallace, is shown here. D. gave the title of earl of Dumbarton to a cadet of the house of Douglas, and commander of a regiment in the royal cause during the troubles in Scotland in the reigns of Charles II. and James II.; the popular song, *Dumbarton's Drums beat bonny, O*, has reference to this personage, who died in exile after the revolution.

DUMBARTONSHIRE (anciently, Lennox, Levenax, or Leven's field), a sickle-shaped co. in the w. of Scotland, bounded e. by loch Lomond, Stirling, and Lanark; s. by Renfrew and the Clyde estuary; w., by loch Long and Argyle; and n., by Perth. It is 35 m. long, and 15 (average 7½) broad, with 35 m. of coast; area, 297 sq. miles. On the e., it has a detached part of 12 sq.m., inclosed by Stirling and Lanark. The s. coast on the Clyde is mostly low and sandy. Loch Long forms 20 m. of the w. border. The Gare loch, one mile broad and 6 long, forms, with loch Long, the Roseneath peninsula in the s.w., studded with beautiful villas. Loch Lomond for 24 m. bounds the e. side of the co., the hills rising from a low, narrow, and wooded shore. Here is the romantic scenery of part of Rob Roy's country described by Scott. The n. of the co. is mountainous or hilly, rising in Ben Voirlich 3,300 ft. The scenery of D. is very romantic, and the co. forms the route to the w. highlands of Argyle and Perth. The ancient ferry from the lowlands to the highlands was between port Glasgow and Cardross. There are many streams, and 9 fresh water lakes, the largest being loch Lomond. The chief rivers are the Clyde, along the s. border; and the Leven, the outlet of loch Lomond, and running 6 m. into the Clyde, at the foot of Dumbarton rock. The rocks are mica-slate, talc-slate, clay-slate, trap, coal-measures, and carboniferous limestone. The mineral products are coal, freestone, limestone, ironstone, and slates. The climate is mild and humid. The arable lands lie chiefly s. of loch Lomond, and along the Clyde e. and w. of Dumbarton castle. On the hills are reared highland cattle and black-faced sheep, and on the plains Ayrshire cattle and Cheviot sheep. In 1875, 45,674 acres were under crops and grass, the chief crops being oats, turnips, barley, wheat, beans, and potatoes. D. has extensive and valuable woods. The chief branches of industry are ship-building and marine-engine making, and bleaching, calico-printing, and dyeing; there are also iron-foundries, breweries, tanneries, and rope-yards. D. is divided into 12 parishes. There are about 70 churches, Established, Free, and United Presbyterian. Pop. '71, 58,659: valuation of the co. in 1877–78, £304,240. D. sends one member to parliament. A portion of the Roman wall of Antoninus runs through the s.e. corner of the co., and ends at Kilpatrick. At Luss is the cairn of St. Kessock, a martyr in 520. There are remains of Roman forts, and of a Roman bridge at Duntocher. Stone coffins and Roman vases and coins have been found.

DUMB CANE, *Dieffenbachia seguina,* formerly called *arum seguinum* and *caladium seguinum,* a plant of the natural order *araceæ,* remarkably differing from the plants of that order generally in its almost arborescent character, but agreeing with them in its acridity, which is in none of them more highly developed. It has a cylindrical stem, with ringed scars and oblongo-ovate leaves. It is a native of the West Indies, and has received its English name from the property which it has of producing dumbness when chewed, its acrid poisonous juice causing an immediate swelling of the tongue, accompanied with excruciating pain. The juice is, however, sometimes used to effect the granulation of sugar. A decoction of the stem is used as a bath and fomentation in dropsy, and the root-stock is used in obstinate constipation.

DUMBNESS. See DEAF AND DUMB.

DUMDUM, the name of a t. and of a valley in India.—1. The town is well known in the military history of the country, standing in lat. 22° 38′ n., and long. 88° 30′ east. It is 10 m. to the s.e. of Barrackpore, and 8 to the n.e. of Calcutta, having extensive accommodations for troops, and a cannon-foundry. The place is famous in connection with the mutiny of 1857, as the scene of the first open manifestation on the part of the Sepoys against the greased cartridges.—2. The valley leads into Cashmere from the s. over what is called the Pir Panjal pass, whose crest is 11,800 ft. above the level of the sea. It is about lat. 33° 45′ n., and long. 75° east.

DUMFRIES', a royal, parliamentary, and municipal burgh, river-port, and county-town of Dumfriesshire, on the left bank of the Nith, 9 m. from its mouth in the Solway firth, 73 m. s. by w. of Edinburgh, and 33 w.n.w. of Carlisle. It stands on a rising ground, surrounded, except towards the sea, by fine, undulating hills, many of which are green to the top. It is an irregularly built town of red freestone, and is reckoned the capital of the s. of Scotland. Two bridges cross the Nith to Maxwelltown, a suburb in Kirkcudbright. One of the bridges is believed to have been built about 1280, by Devorgilla, the mother of John Baliol, and to have had 9 arches, although some antiquaries claim 13, with a central gate. It is largely, however, a structure of the 17th c.; only six of its arches now remain; and it is limited to foot-passengers. The most noticeable building in D. is the mid-steeple, in the center of the High street, which was at one time believed to have been erected by Inigo Jones; the architect is now, however, ascertained to have been Tobias Bachup, of Alloa. The very high tides of the Solway firth bring vessels of 40 tons up to the town, and larger ones to the river quays below the town. In 1875, 496 vessels of 25,675 tons entered, and 306 of 19,106 cleared the port. D. has three large and two small manufactories of woolen cloths (Tweeds); it manufactures hosiery, leather, baskets, and wooden shoes; and it has a considerable reputation for its dye-works, and the nurseries in its vicinity. The chief exports are woolen cloths, wool, hosiery, shoes, sheep, grain, wood, and bark. D. is noted for its markets, live-stock being here transferred from Scotch to English dealers. Pop. 71,

15,435. It unites with Annan, Sanquhar, Lochmaben, Kirkcudbright, and its suburb, Maxwelltown, in sending one member to parliament. D. arose, it is believed, in a castle, of which nothing now remains. The early Scotch and English kings had frequent contests for its possession. About 1200, a monastery was founded here, in the chapel of which Comyn (q.v.) was stabbed by Robert Bruce in 1305. The Highlanders, under prince Charles, in 1745, fined D. £4,000, and plundered and burned it. Burns spent the last years of his life here as an exciseman, and the house he resided in, and the mausoleum erected to his memory, are among the most notable objects of the place.

DUMFRIESSHIRE, a border co. of Scotland, on the Solway firth, having Kirkcudbright on the west. It forms an irregular ellipse, 55 m. by 32, with 22 m. of coast-line on the Solway firth, to which its surface slopes; area, 1103 sq.m., or 705,946 acres. The n. half is mountainous, rising, in Hartfell, 2,650 ft.; Lowther Hills, 2,522; Black Lark, 2,890; Ettrick Pen, 2,258; and Queensberry, 2,259. The s. part is undulating. The country on the Solway firth (q.v.) for 10 m. inland is flat, sandy, and gravelly, with tracts of "cobbles," or large stones. D. is drained principally by three rivers—the Nith, 45 m. long; the Annan, 40; and the Esk, 40; which run s.e. and s. into the Solway firth from the n. border of the co., and divide it into three districts or dales, called after the rivers. There are many small lochs, three of them near Lochmaben, containing vendace. D. consists of Silurian, permian, and carboniferous strata, with eruptions of trap. Tortoise footprints have been found in the new red sandstone of Annandale, at Corncockle. The mineral products are coal, limestone, ironstone, lead, and silver. There are extensive lead-mines at Wanlockhead, 2 m. from Leadhills, in Lanarkshire. Gold has been obtained in quartz veins in the hills near Wanlockhead; a mass of 5 ozs. found there is now in the British museum. There are noted sulphureous springs at Moffat, and chalybeate ones at Hartfell. The climate is moist and mild, and most of the land has a southern exposure. There are rich alluvial tracts along the rivers and on the Solway firth. The Lochar Moss, a peat tract on the Solway firth, is 13 by 2 to 3 m., and contains shells, trees, and fragments of ships. The chief occupations are agriculture, and the rearing of cattle, sheep, and pigs. In 1875, there were 214,170 acres, or between one third and one fourth of the co., under all kinds of crops. Of these, 49,710 were under corn crops, and 25,379 under green crops. Sheep-farms occupy the hills. The chief exports are cattle, sheep, grain, wool, hams, and bacon. There are fisheries of salmon in the rivers. In 1871, D. had 74,808 inhabitants; 12,672 children between 5 and 13 years of age in receipt of education. D. sends one member to parliament. The co. abounds in antiquities. D. formed part of Valentia in Roman times, and subsequently of the kingdom of Strathclyde.

DÜ'MICHEN, JOHANNES, b. Silesia, 1833; studied at Berlin, and turned his attention to Egyptian archæology. He made several trips to that country, and made some remarkable discoveries concerning the temple of Denderah. He has written nearly a dozen works on Egyptian and other archæology.

DUMMER, JEREMIAH, 1680–1739; b. Boston; graduated at Harvard; studied theology and spent some years in the university of Utrecht. He was in England as one of the agents of Massachusetts, and became familiar with Bolingbroke, some of whose views, it is thought, he adopted. He published a *Defense of the New England Charters*, and some less important works. His brother, WILLIAM, 1677–1761, lieutenant governor, founded the Dummer academy at Newbury, Mass.

DUMMOW', a t. of India, in the division of Jubbulpore, Central Provinces, stands in lat. 23° 50′ n., and long. 79° 30′ e., being 775 m. to the westward of Calcutta. It has a large bazaar, and is abundantly provided with wells. Its *district* has an area of 2,800 sq.m., and a pop. of (1872) 269,642; the town, of 8189. D. is also spelt *Damoh*.

DUMONT, PIERRE ETIENNE LOUIS, an able propagator of the Benthamite philosophy, was b. at Geneva, 18th July, 1759, studied theology, and after officiating as a minister for a short time in his native town, proceeded to St. Petersburg in 1783, where he accepted the charge of the French Protestant church. In 1785, he left Russia, went to England, and became tutor to the sons of lord Shelburne, afterwards marquis of Lansdowne. His superior talents, liberal sentiments, and fine character, soon recommended him to the illustrious whigs of that period; with sir Samuel Romilly, in particular, he formed a close friendship. During the early years of the French revolution, D. was at Paris, where he became greatly attached to Mirabeau, regarding whom he has given the world much important information in his *Souvenirs sur Mirabeau et sur les deux Premières Assemblées Législatives* (which were not published till 1832, seven years after the author's death). From this work, it appears that D. wrote many of the best articles and speeches attributed to Mirabeau. In 1791, D. returned to England, and formed an intimacy with Bentham. This was certainly the most important event in his life. Deeply convinced of the value of that philosopher's views of legislation, he requested his friend to allow him to arrange and edit his unpublished writings on this subject. Bentham gave him his manuscripts. D. labored earnestly to abridge, elucidate, correct, and simplify what he had received. The results appeared in his *Traité*

de Législation Civile et Penale (Geneva, 1802); *Théorie des Peines et des Récompenses* (Geneva, 1810); *Tactique des Assemblées Législatives* (Geneva, 1815); *Preuves Judiciaires* (Geneva, 1823); and the *Organization Judiciaire et Codification* (1828, a posthumous work). D. returned to Geneva in 1814, and became a member of the representative council. In this office he found many opportunities of putting the principles of Bentham into practice, and thus greatly benefited his native city. He died in 1825, at Milan.

DUMONT D'URVILLE, JULES SÉBASTIEN CÉSAR, 1790–1842; native of Normandy; a French navigator. He was self-taught, mastering botany, entomology, and a number of modern and ancient languages. In 1820, while on a surveying trip in the Mediterranean, he was so fortunate as to recognize in a Grecian statue just unearthed the Venus of Milo, and to secure its preservation. In later years, he was concerned in explorations around the Australian continent, New Zealand, Van Dieman's Land, and other Pacific and Indian islands. In 1830, he transported the exiled Charles X. to England. His next and most important venture was in antarctic exploration. He sailed in Sept., 1837, with two vessels. In Jan., 1838, they reached the antarctic ice, along which they coasted to the e. for 300 miles. Turning w., they visited the South Orkneys, the New Shetlands, and discovered Joinville land and Louis Philippe's land; but sickness compelled them to run to Chili. Thence they crossed the Pacific, visiting the Fiji and Pelew islands, New Guinea, and Borneo. In 1840, they returned to the antarctic region, and discovered Adélie land. In Nov., he arrived at Toulon. D'Urville was at once appointed rear-admiral. In 1842, he was killed, with his wife and son, in a railway accident. His works on natural history, and especially his collections, are valuable.

DUMOURIEZ, CHARLES FRANÇOIS, a French gen., was b. at Cambrai, 25th Jan., 1739, entered the army in 1757, and served in Germany during the seven years' war. On the conclusion of hostilities in 1763, D., who possessed a restless, adventurous genius, went from one country to another, seeking active employment. Under Louis XVI., he held the office of commandant of Cherbourg, where he commenced the formation of a great naval establishment. As the revolution drew on, D. began to attach himself more closely to the popular party. In 1790, he became connected with the Jacobin club, and during the same year was appointed military commandant of lower Normandy. After holding for a short time the office of minister of foreign affairs, he became lieut.gen. in the army of the north, commanded by maréchal Luckner. The allies were advancing in great force. By a series of bold and rapid maneuvers, D. prevented his enemies from sweeping over the plains of Champagne, and finally took up his position at Grand-Pré. Succors quickly arrived, and the victory of Kellermann at Valmy compelled the invaders to retreat. It is generally admitted that by his admirable strategic movements at this critical period D. saved France. A winter campaign in Belgium followed, and on the 5th and 6th Nov., 1792, D. overthrew the Austrians under the duke of Sachsen-Teschen and Clairfait at Jemappes. The campaign of 1793, which aimed at the complete conquest of the Netherlands, was opened with the siege of Maestricht; Breda and other places were taken by the French; but at Neerwinde, D. sustained a severe defeat from the Austrians under Coburg. D.'s Jacobinism had been cooling for some time, on account of the anarchy prevailing at Paris, and when commissioners were sent to remonstrate with him on account of his monarchical leanings, he told them nothing could save France from the horrors of anarchy but a constitutional monarchy; D. then entered into secret negotiations with Coburg, evacuated Belgium, and promised to exert himself on behalf of the Bourbon family. He was now accused of being a traitor, by the authorities of Paris; but when requested by the commissioners to proceed to the capital, and stand his trial, he answered by handing over the representatives of the people to the Austrians. He next endeavored, but in vain, to win the army over to his plan of marching upon Paris, and re-establishing the royal authority, and D. had to take refuge, accompanied by the duc de Chartres, in the ranks of the enemies of France. The convention set a price of 300,000 francs upon his head. After wandering through many countries of Europe, he finally settled in England, where he died an exile at Turville park, near Henley-upon-Thames, 14th Mar., 1823. Besides a multitude of pamphlets, D. wrote *Mémoires du Général Dumouriez* (Hamburg, 1796), and *La Vie et les Mémoires du Général Dumouriez* (3d edit., Paris, 1822–24).

DUMPY LEVEL, a leveling instrument for short distances. It has a short telescope with large field, and the compass is fixed underneath.

DUN, a root common to the Celtic and Gothic languages, signifying a hill or height. Besides giving rise to the Fr. *dunes*, Ger. *dünen*, Eng. *downs* (q.v.), it enters extensively into the names of places (becoming often *dum, don*), as *Dun*kirk, *Dum*barton, *Don*egal. It is allied to the Ang.-Sax. *tun, ton*, whence *town* (q.v.).

DÜ'NA, DWI'NA, or DVI'NA, the name of a river of Russia, which rises in the government of Tver, in the neighborhood of the source of the Volga, and flows w.s.w. in a course almost parallel to that of the Dnieper. At Vitebsk, the D. turns to the w., then to the n.w., and advances in that direction toward its debouchure in the gulf of Riga,

passing the towns of Disna, Drissa, Dünaburg, Jacobstadt, and Riga. The entire length of the D. is about 650 miles. It is navigable from Dünamunde, at its mouth, to Velij, on the border of the government of Smolensk—a distance of 400 m.; but the navigation, owing to its shallows, its rock obstructions, and sand-banks, is extremely difficult and dangerous, except during the spring and autumn floods. The basin of the D. is estimated at 28,350 sq. m.; at Riga, its breadth is 2,400 feet. In the spring, the surface of the D. is covered with rafts and planks, which are floated down from the forests of the provinces through which it flows. Its waters, which abound in fish, are connected with those of the Dnieper by means of the Beresina canal, which thus connects the Black sea and the Baltic. See also DWINA, NORTHERN.

DÜNABURG, a strongly fortified t. of western Russia, is situated on the Düna, in the government of Witebsk. It is of great military importance, owing to the strength of its fortifications. It has three fairs in the course of the year, and considerable trade. Pop. '67, 29,613. D. was formerly the capital of Polish Livonia.

DUNBAR, a royal, parliamentary, and municipal burgh, and very ancient seaport and t. in the n.e. of Haddingtonshire, on an eminence at the mouth of the firth of Forth, 29 m. e.n.e. of Edinburgh. The coast near D. consists of basaltic rocks and islets, and gives fine views of the Bass rock, the isle of May, and Fifeshire. D. is a fine old town. It has a sailcloth and cordage manufactory, a paper mill, and extensive tile-works, breweries, etc., but the chief industry is the fisheries, in connection with which there are large curing establishments. The old harbor is impeded at the entrance by craggy islets and sunken rocks, but is accessible to vessels of 300 tons. About the year 1840, an additional harbor, called the Victoria harbor, was erected at D., at the expense of the fishery board and town; with recent important repairs and improvements, it has cost altogether upwards of £50,000. It has 4 ft. at low water, and is considered one of the best suited for fishery purposes in the country. From 4,000 to 5,000 tons of herrings are annually exported from D., besides what are used for local consumption. The other exports are chiefly corn and potatoes. Pop. '71, 3,311. D. unites with North Berwick, Jedburgh, Haddington, and Lauder in sending a member to parliament. On the high rocks at the entrance to the new harbor are a few fragments of the ruins of a castle, which, from the end of the 11th c., was the chief seat of the ancient earls of March. It was once very strong, and an important security against English invasions: Edward I. took it, and Edward II. fled thither after the battle of Bannockburn; it was demolished in 1333, and rebuilt in 1336; it was successfully defended in a siege of six weeks against the earl of Salisbury by Black Agnes, countess of Dunbar, in 1338; it sheltered queen Mary and Bothwell in 1567; and in the same year it was destroyed by the regent Murray. In 1650, Cromwell, at the "Race of Dunbar," defeated the Scottish army under Leslie.

DUNBAR, WILLIAM, the greatest of the old Scottish poets, is supposed to have been born about 1460. In 1475, he went to St. Andrews, where, in 1477, he took the degree of B.A., and in 1479, that of M.A. Considerable obscurity rests upon his career for about twenty years after he left the university. From his own writings, we learn that he entered the order of St. Francis, and was employed for some time as an itinerant or preaching friar. In that capacity, he "ascended the pulpit at Dernton and Canterbury, and crossed the sea at Dover, and instructed the inhabitants of Picardy." He appears to have entered the king's service, and to have been retained as "clerk" or secretary to some of James's numerous embassies to foreign courts. In 1500, he obtained from the king a yearly pension of £10. In 1501, he visited England, in the train, as his biographers suppose, of the ambassadors sent thither to conclude the negotiations for the king's marriage. On the 9th May, 1503, three months before the queen's arrival, he composed in honor of the event his most famous poem, the *Thrissil and the Rois*. He seems now to have lived chiefly about court, writing poems, and sustaining himself with hope of preferment in the church. On the 17th Mar. 1504, he received a gift for saying mass for the first time in the royal presence. At Martinmas, 1507, his pension was doubled, and three years afterwards, it again received augmentation. He is supposed to have visited the northern parts of Scotland in May, 1511, in the train of queen Margaret. After the ruinous defeat at Flodden, and the confusion consequent on the king's death and a prolonged regency, D.'s name disappears altogether. He is supposed to have died about 1520.

As a poet, he possessed a wonderful variety of gifts; his genius comprised the excellences of many masters. He is at times as rich in fancy and color as Spenser in the *Faery Queen;* as homely, and shrewd, and coarse as Chaucer in the *Miller's Tale;* as pious and devotional as Cowper in his *Hymns;* and as wildly grotesque in satire as Burns in his *Death and Doctor Hornbook*. When Scott read portions of his works to Crabbe, in Edinburgh, the latter remarked that, "before the Ayrshire plowman, Scotland possessed at least one great poet." A complete and carefully elaborated edition of D.'s works, by Dr. David Laing, was published at Edinburgh in 1834.

DUNBLANE, a city and burgh of barony in the s. of Perthshire, picturesquely situated on the left bank of the Allan, on the Scottish Central railway, 28 m. s.w. of Perth, and 5 n. of Stirling. It takes its name from St. Blane, a bishop of the 7th or 8th c., said to have been born in Bute. It mainly consists of one street of old-fashioned

houses. Pop. '71, 1921. The cathedral of D., chiefly in the first-pointed or early English style, about the year 1240, is now in ruins, except the choir, used as the parish church, 80 by 30 ft., with a tower 128 ft. high, the first four stages of which are Romanesque work of about the year 1140. The prebendary stalls of richly carved oak still remain. Of the bishops of D., by far the most celebrated was Robert Leighton, who held the see from 1661 till 1672, when he was translated to Glasgow. A path near the river, which he is said to have frequented, still bears the name of "The Bishop's Walk;" and the library which he bequeathed to his diocese, is still kept in the town. Two m. from D. was fought, in 1715, the indecisive battle of Sheriffmuir, between the royal forces, under the duke of Argyle, and the troops of the pretender, under the earl of Mar. D. once had an ancient Culdee monastery.

DUNCAN, ADAM, Viscount, a celebrated British admiral, was b. in 1731 at Dundee, entered the navy as midshipman in 1746, became lieut. in 1755, and in 1761, commander of the *Valiant*, of 74 guns, which took part in the expedition to Havana under admiral Keppel. In 1789, he was appointed rear-admiral of the blue, and in 1793, vice-admiral of the blue, but had little opportunity of distinguishing himself, and was even meditating, it is said, retiring altogether from the service, when he was appointed to the command of the united English and Russian squadron in the North sea, with the special design of watching the movements of the Dutch fleet—Holland and France being then both at war with England. D.'s blockade of the Texel was one of the most effective ever made, and the Dutch trade was almost ruined. During the blockade, a mutiny took place among the seamen, and D.'s position was for some time very critical, but the insubordination was ultimately quelled. Although weakened by the recall of the Russians, he gained a brilliant victory over the Dutch near Camperdown, 11th Oct., 1797, where he took the Dutch admiral, De Winter, prisoner. D. was rewarded with a pension of £2,000, and raised to the peerage, with the title of viscount. In 1799, he was promoted to the rank of admiral of the white, and died 4th Aug., 1804, after having inherited the family estates in Perthshire, on the death of his brother.

DUNCAN, THOMAS, R.S.A., and A.R.A., was b. at Kinclaven, Perthshire, May 24, 1807; and died at Edinburgh, 25th May, 1845. He studied in the Trustees' academy, under sir William Allan; was his successor as head-master of that school, and one of the most distinguished members of the royal Scottish academy. His portraits, and historical and fancy subjects, evince delicate feeling for female beauty, and keen appreciation of the humorous in Scottish character. The drawing is always careful and correct, and the coloring remarkable for clearness and delicacy. Though he exhibited but few pictures in the royal academy of London, they at once attracted marked attention, and he was elected an associate of that body in 1843. The principal works he exhibited there were: "Anne Page and Slender;" an illustration from the ballad of *Auld Robin Gray*, now in the Sheepshanks gallery, South Kensington; "Prince Charles's Entry into Edinburgh after the Battle of Prestonpans"—and the same prince, when a fugitive, concealed in a cave. He had now entered on a most successful career, and was engaged on the studies for two important works: "Wishart Dispensing the Sacrament on the Day of his Martyrdom;" and a large picture for the marquis of Breadalbane, "Queen Victoria at Taymouth," when he was seized with an illness which terminated fatally. One of his latest works was a portrait of himself; it is now in the national gallery of Scotland, and is an excellent specimen of careful drawing, united to great power of color and effect. That D. was remarkable for energy and industry, is proved by the number and high quality of the works he executed, though he died at the early age of thirty-eight. His portraits, especially those of ladies and children, will always hold a high place. Though constantly engaged on fancy subjects, he every year exhibited a very considerable number of portraits. In addition to the works above referred to, the following is a list of the principal historical and fancy subjects exhibited by him in the royal Scottish academy—1829: "The Death of Old Mortality," and "A Milk-girl." 1830: "The Braw Wooer," and "Children and Rabbit." 1831: "Lucy Ashton," and finished sketch of "Jeanie Deans and the Robbers." 1832: "Girl with Flowers." 1834: "Cuddie Headrig Visiting Jenny Dennison." 1835: "Mary Queen of Scots compelled to Sign her Abdication." 1836: "A Covenanter," and "Old Mortality Renewing the Inscription on a Tombstone." 1838: "The Secret Chamber—Isaac of York Visiting his Treasure," "The Lily of St. Leonards," and "The Friends." 1839: Study of "A Highland Stag, with Dead Game and Fruit." 1845: "The Martyrdom of John Brown of Priesthill, 1685." 1846: The finished sketch of "Wishart Dispensing the Sacrament on the Day of his Martyrdom, Mar. 1, 1546," was exhibited after the artist's death.

DUNCANSBY HEAD (the *Berubium* of Ptolemy), a promontory forming the n.e. extremity of Caithness, in lat. 58° 39′ n., and long. 3° 1′ w., and one mile and a half e. of John o' Groat's house. In the vicinity are deep long chasms or *ghoes*, in the Devonian strata, and curious detached sandstone columns in the sea called *stacks*. One of the chasms is 300 yards long, 12 to 15 wide, and 100 ft. deep, and communicates with the sea by three openings, one of which is arched. The horizontal beds of the sides of the perpendicular gullies look like ruined walls.

DUNCIAD, THE, by Alexander Pope, was published in 1728, in three books; and to these, in 1742, a fourth book was added. Pope had been, during the greater part of his career, afflicted by a host of critics and detractors. His own genius had not been spared; the worst motives, personal and literary, had been imputed to him; and he resolved to mete unto his enemies the measure which had been meted unto himself. Hence the origin of *The Dunciad*. Never was chastisement more complete. On its publication, a universal howl of rage and pain arose. The satire conferred immortality on his opponents. Pope was a good hater, and his hatred and contempt defy the tooth of time more completely than all the balsams of the Pharaohs.

DUNCKER, MAXIMILIAN WOLFGANG, b. Berlin, 1811; graduate and professor at Halle. He was a member of the Frankfort parliament, and of the Prussian diet. In 1861, he was councilor to the crown prince, and in 1867, director of the Prussian archives. His chief work is a *History of Antiquity*.

DUNCOMBE, THOMAS SLINGSBY, an English politician, nephew of first lord Feversham, was b. 1796. He was elected M.P. for Hertford in 1824, assisted in carrying the reform bill, and became a prominent member of the extreme liberal party. In 1832, he was rejected at Hertford; but in 1834 he was returned for Finsbury, which seat he retained in the parliament which assembled in 1859. In 1842, he presented the Chartist petition, signed by 3,000,000 of the lower classes in favor of universal suffrage, vote by ballot, short parliaments, etc. In 1842, the then home secretary, sir James Graham, having sanctioned the opening of the letters of Mazzini, D. stood up in the house of commons and denounced, with bitter and scathing invective, the adoption of the post-office spy-system on English soil. He was an earnest advocate of Jewish emancipation; and his motion in 1858 for placing baron Lionel Rothschild on a committee of the house of commons, was soon followed by the concession, by the latter chamber, of the right of Jewish members to sit in the house of commons. He died Nov. 13, 1861.

DUNDALK, a parliamentary and municipal borough and seaport, the capital of the county of Louth, Ireland, is beautifully situated at the mouth of the Castleton river, 50 m. n. of Dublin. It is overlooked on the n.e. by the Carlingford mountains. Vessels drawing 16 ft. can enter the harbor. D. has manufactures of tobacco, soap, leather, starch, and salt; steam flour-mills; considerable fisheries; a distillery, brewery, and a flax-spinning mill. The chief imports, especially from Liverpool, are groceries, timber, coal, iron, slates; and the exports, flax, linen, and all sorts of agricultural and dairy products and live-stock. D. is the chief outlet for the produce of the counties of Louth, Monaghan, and Cavan. Pop. '71, 11,327, of whom 8,969 were Roman Catholics, and 1803 Episcopalians. It sends one member to parliament. It has the remains of a Franciscan friary and a Druids' circle. The last king of all Ireland was crowned here. Edward Bruce took D. in 1315, and held his court here till killed in battle at Faughart, in the vicinity, in 1318. D. was captured by the Irish in 1641, by Cromwell in 1649, and by Schomberg in 1689. In 1875, the borough rates were £1261; the harbor revenue, £8,561. In 1875, 870 vessels of 151,251 tons entered, and 366 of 99,543 tons cleared the port. DUNDALK BAY is 8 m. broad by 7 deep, and with 4 to 6 fathoms water in the middle. It receives the Fane, Dee, and Castleton rivers.

DUNDAS'. 1. A castle and manor on the s. bank of the firth of Forth, near South Queensferry; the castle is a square tower of the 15th c., with modern additions; the manor was the original seat of the distinguished family of D., to whose progenitor it was granted by the earl of March about the year 1150.—2. A town in the province of Ontario, Dominion of Canada, at the head of Burlington bay, at the w. of lake Ontario. Pop. '71, 3,135. It is a station on the Great Western railway, and has a number of mills and manufactories.—3. An island, belonging to Great Britain, situated on the n.w. coast of America, 40 m. n.e. of Queen Charlotte island. It has Dixon's Entrance (q.v.) on the w., and is separated by Chatham sound from the most southerly of the Alaskian islands.—4. A group of nearly 500 islets, all of coralline formation, lying off the e. coast of Africa, being about lat. 1° south. There is only one secure harbor.—5. A river flowing into Delagoa bay (q.v.).—6. A strait in North Australia, separating Melville island from Coburg peninsula, being 18 m. in breadth.

DUNDAS, a co. in Ontario on the St. Lawrence, intersected by the Grand Trunk railroad; pop. '71, 18,777.

DUNDAS (of Arniston), the name of a Scottish family singularly distinguished for legal and political talent. Sir James D., the first of Arniston, received the honor of knighthood from James VI., and was governor of Berwick. His son, sir James D., was appointed a judge of the court of session in 1662, and took his seat on the bench under the title of lord Arniston, but was soon after deprived of his office for refusing to abjure the "National and Solemn League and Covenant." He died in 1679. His eldest son, sir Robert D., who also rose to the bench, died in 1727. DUNDAS, ROBERT, the son of the preceding, was born 9th Dec., 1685; became a member of the faculty of advocates in 1709; and in 1717 was appointed solicitor-general for Scotland, an office which he filled with great ability in a period of much political confusion. In 1720 he was made lord advocate; and in 1722 was chosen to represent the county of Edinburgh in the British parliament, where he honorably distinguished himself by his attention to

Scottish affairs. When sir Robert Walpole came into power in 1725, D. resigned his office, when he was elected dean of the faculty of advocates. In 1737, he was raised to the bench, when, like his father and grandfather, he took the title of lord Arniston. On the death of lord president Forbes of Culloden, in 1748, he was appointed his successor. He died in 1753. As an advocate, D. was a powerful and ingenious reasoner, and though somewhat disliked on the bench, his ability was universally admitted.—DUNDAS, ROBERT, the eldest son of the preceding, was born 18th July, 1713, studied at Edinburgh and Utrecht, was admitted to the Scottish bar in 1738, and rose to be lord advocate (1754), and president of the court of session (1760). D. died at Edinburgh, 13th Dec., 1787.

DUNDAS, the Right Honorable HENRY, Viscount MELVILLE, and Baron DUNIRA, brother of the preceding, was b. in 1741, and educated at the university of Edinburgh. He was admitted a member of the Scottish bar in 1763. As a younger son of a pretty numerous family, his circumstances were rather straightened; but his assiduity, his large share of the family talent, and no doubt of the family influence, soon procured him advancement in his profession. He was successively appointed deputy-advocate and solicitor-general. In 1774, he was returned to parliament for the county of Edinburgh, and in the following year was appointed lord-advocate for Scotland. Two years after, he was made keeper of the king's signet for Scotland. D.'s career in parliament was highly successful, though not very creditable to his political consistency. Elected in opposition to ministerial influence, he soon allied himself with the party in power, and became a strenuous supporter of lord North's administration, being one of the most obstinate defenders of the war with the American colonists. When lord North resigned in 1781, D. continued to hold the office of lord advocate under the Rockingham ministry. On the question of the war with America, D. had been opposed to Pitt; but when the coalition ministry was formed by Fox and lord North, he passed over to the side of his old opponent, and became Pitt's ablest coadjutor. When Pitt returned to the helm of the state in 1784, D. was appointed president of the board of control. In 1784 he introduced a bill for restoring the estates in Scotland forfeited on account of the rebellion of 1745. In 1791, he was appointed principal secretary of state for the home department. He also held a great number of other offices, one of which, the treasurership of the navy, involved him some years after in much trouble. D.'s aptitude for business was undeniable. Many of the most important public measures originated with, or were directly promoted by him. Among such were the formation of the fencible regiments, the supplementary militia, the volunteer corps, and the provisional cavalry; in short, the whole of that domestic military force raised during the war consequent on the French revolution. When Pitt resigned in 1801, D. did the same. In 1802, under the administration of Mr. Addington, he was elevated to the peerage by the titles of viscount Melville and baron Dunira. In 1805, his lordship was accused of "gross malversation and breach of duty," while acting as treasurer of the navy. The trial commenced 29th April, 1806; but in spite of the splendid array of whig talent against him, D. was acquitted on all the charges. After this, however, he took little part in public affairs, spending the most of his time in retirement in Scotland. He died at Edinburgh, 27th May, 1811.

DUNDEE (Lat. *Tuodunum*, the "hill or fort on the Tay") a royal parliamentary and municipal burgh and seaport, in the s. of Forfarshire, on the left bank of the estuary of the Tay, here two m. broad, 10 m. from the entrance of that river into the sea, 50 m. n.n.e. of Edinburgh, 20 e.n.e. of Perth, and 14 s.e. of Forfar. In population, it is the third town in Scotland. It stands mostly on the slope between Dundee law (525 ft. high, composed of trap, and with traces of ancient vitrification) and Balgay hill and the Tay. The new streets are wide and well laid out. The most striking architectural features of the town are—the town hall, in the Roman Ionic style, with a spire 140 ft. high, erected by the "elder Adams," in 1734; the Albert institute and free library, in 15th c. Gothic, from designs by sir Gilbert Scott, recently erected at a cost of £30,000; the royal exchange, built in the Flemish pointed style of the 15th c., at a cost of upwards of £12,000, and opened in 1856; the eastern club house; the corn exchange, capable of containing 2,000 people; the infirmary; the justiciary and sheriff court buildings; the post-office; the high school; the town's churches, with the old tower, 156 ft. high, restored in 1873, under the charge of sir Gilbert Scott, at a cost of £7,000; St. Paul's Episcopal church, with a tower and spire 217 ft. high; St. Paul's free church, with a tower and spire 167 ft. high; and St. Enoch's free church, with two handsome towers; the Morgan hospital (opened 1868), erected and endowed at a cost of nearly £80,000, under the will of John Morgan, a native of Dundee, for the maintenance and education of 100 boys; and the new orphan asylum. D. has several public parks, one of which, the Baxter park, on a beautiful slope to the eastward of the town, is 37 acres in extent, and was presented by the late sir David Baxter, at a cost of £50,000; another, to the westward of the town, occupies the hill of Balgay, and is finely wooded and beautifully laid out, its extent being about 60 acres. D. is the chief seat in Great Britain of the manufacture of coarse linen fabrics (Osnaburgs, sheetings, ducks, dowlas, drills, canvass, and cordage). Manufactures of jute are almost exclusively carried on here. The consumption in D. of this material, which is grown in India, amounts to fully 120,000 tons annually. The raw material costs in D. a little over 2*d.* per lb. and the cloth made from it, reck-

oned by weight, is the cheapest textile fabric made in Great Britain. Of jute many varieties of fabric are made, from the coarsest nail-bagging to carpets of great beauty. This range includes packages for every species of merchandise, sacks for wool, coffee, guano, etc. The annual value of the flax, hemp, and jute manufactures in D. is upwards of £5,500,000. D. is also famous for its manufacture of confectionery, which is exported to all parts of the world. One firm uses 150 tons of bitter oranges annually in the manufacture of marmalade. D. is the center of the whale and seal fishing trade of Great Britain. Ship-building (both wood and iron) and machine-making are carried on to some extent. D. has magnificent harbors in addition to the tide harbor, several large wet docks, a graving-dock, and a slip for large vessels. The docks have been erected at a cost of upwards of £700,000. In 1875, 1450 vessels of 393,525 tons entered, and 869 vessels of 246,968 tons cleared the port. At the n. end of the mid quay stands the royal arch, in commemoration of her majesty's landing here in 1844. D. is well supplied with water. A little to the w. of D. one of the largest iron bridges ever constructed is being built across the Tay. It is to consist of 90 spans, some 245 feet long. Pop. '71, 118,977. D. sends two members to parliament. It was an important place in the 12th century. Edward I. was here in 1296 and 1303. Wallace is said to have taken the castle in 1297, and Bruce demolished it in 1313. The duke of Lancaster burned D. in 1385, and the marquis of Montrose pillaged it in 1645. Charles II. lived here, after his coronation at Scone, in 1650. On the refusal of D. to submit to Cromwell, gen. Monk, 1651, sacked and burned it, massacring 1000 citizens and soldiers, and filling 60 vessels with booty, which were totally wrecked on their voyage to England. D. was one of the first Scotch towns to adopt the reformation. Wishart the martyr preached here during the plague of 1544.

DUNDEE, VISCOUNT. See GRAHAM, JOHN.

DUNDONALD, THOMAS COCHRANE, Earl of, son of the ninth earl of Dundonald, was b. Dec. 14, 1775. He, while still a boy, entered the 104th regiment. At the age of 17, he joined the *Hind* corvette, commanded by his uncle, capt. sir Alexander Cochrane. In 1800, he became master and commander of the *Speedy* sloop-of-war, of 14 guns and 54 men; and in 10 months he took 33 vessels, carrying together 128 guns and 533 men, besides assisting in the capture of many others. D. received his post-rank, 1801, for the capture, by boarding, of *El Gamo*, a Spanish frigate of 32 guns, off Barcelona. In 1803, he was appointed to the *Arab*, 22, and served at the blockade of Boulogne. In 1804, he removed to the *Pallas* frigate, 32, and was sent out to assist his uncle, then employed in the blockade of Ferrol. He made several valuable prizes while cruising off the Spanish coast, among others the *Fortuna*, with specie to the amount of £150,000, besides merchandise, but generously returned 10,000 crowns to the Spanish capt. and supercargo. In 1806, he cut out the *Tapaguese* corvette, which lay in the Gironde, under the protection of two heavy batteries. He destroyed the semaphores along the French coast, and carried by storm the battery at Pointe l'Equilon, which he blew up. Being now transferred to *L'Impérieuse*, he took and destroyed, in the month ending Jan. 7, 1807, 15 of the enemy's ships, chiefly laden with wine and provisions. He was next sent to co-operate with the patriots on the coast of Catalonia, and contributed to the surrender of the castle of Mongat. After harassing the French coast, and destroying the semaphores on the coast of Languedoc, he volunteered for the defense of fort Trinidad, at Rosas, on the coast of Catalonia. At the head of 80 of his own men, and the same number of Spaniards, he repelled 1000 of the enemy in an assault made by them upon the castle. He protracted the siege for 12 days, then blew up the magazine, and returned to his ship. In April, 1809, he was selected by the admiralty for the daring and hazardous service of burning the French fleet then lying at anchor, and blockaded by lord Gambier, in the Basque roads. At night he went on board one of the fireships, containing 1500 barrels of gunpowder, and performed the service intrusted to him with characteristic intrepidity. He was rewarded with the knighthood of the bath. He had been chosen M.P. for Westminster in 1807, and his charges of incompetency against lord Gambier led to a court-martial upon that nobleman. Lord Gambier, after a partial trial, was acquitted, and the professional prospects of his assailant were ruined. During the rest of the war, the country lost the incalculable benefit of his services at sea, the navy gaining, on the other hand, such small advantage as could in those days be derived from D.'s protest in parliament against naval abuses. Early in 1814, he was accused of complicity in fraudulent stock-jobbing transactions. A rumor of the downfall of Napoleon having caused a sudden rise in the funds, D. and his friends were charged with having fraudulently propagated the rumor, and with having "sold out" to a large amount. He was found guilty of fraud, and was sentenced to pay a fine of £1000, to suffer a year's imprisonment, and to stand in the pillory. The latter part of the punishment was remitted, but he was deprived of the order of the bath, of his rank in the navy, and expelled from the house of commons. A new writ was issued for Westminster; but his constituents immediately re-elected him, notwithstanding his expulsion from the house; and his daring was shown by his escape from prison, and his re-appearance in the house. He represented Westminster until 1818, when, panting for a more active and eventful career, he drew his sword in defense of the independence of the South American colonies of Spain. The command of the fleet of the republic of Chili

was offered to him, and the terror of his name materially contributed to the success of the national cause. Valdivia, the last stronghold of the Spaniards, was captured by him. Another daring exploit was the cutting out of a large 40-gun frigate from under the guns of the castle of Callao, 5th Nov., 1820. The emperor of Brazil, Dom Pedro, afterwards gave him the command of the Brazilian fleet, and created him a marquis. In 1827 and 1828, he assisted in the Greek war of independence. In 1830, the whig administration of earl Grey came into office, and, believing him to have been the victim of a cruel and unjust persecution, hastened to restore him to his naval rank. In 1831, he succeeded to the earldom. In 1847, queen Victoria conferred on him the grand cross of the bath. He was also appointed commander-in-chief on the North American and West India station. In 1851, he was vice-admiral of the white, and in 1854, rear-admiral of the United Kingdom, a distinction which he held until his death. On his retirement from active service, he devoted himself to scientific inventions. He made improvements in poop and signal lights, and especially turned his attention to naval projectiles. He declared himself to be in possession of a means of annihilating an enemy's fleet, and during the Russian war offered to destroy Sebastopol in a few hours with perfect security to the assailants. His plans were, however, rejected. When upwards of 80 years of age, he published his autobiography—the record of a career almost unequaled even by British seamen for desperate service and dauntless exploit. He died Oct. 31, 1860, and was interred in Westminster abbey. In his naval expeditions, it was his fate to be constantly opposed to forces greatly superior to his own in numbers and metal. His inventiveness and fertility of resource under such circumstances have perhaps never been equaled. His daring would have been, in a man of less genius, the height of rashness, yet the almost unvarying success of his maneuvers and exploits attests his forethought, and his happy adaptation of slender means to the achievement of great ends and noble enterprises. In person, he was tall and broad built; and a slight stoop, contracted by service in the small sloops and corvettes of his early days, scarcely impaired a height of stature that might be described as commanding. His features were Scottish in character, and strongly marked, bearing in deep lines the traces of struggle, sorrow, and the wear and tear of an unusually long, active, and eventful life.—In 1877, a petition was presented to the queen, asking compensation to D.'s heirs for his 18 years' loss of pay and allowances as a naval officer—a petition which was ultimately granted.

DUNDRUM BAY, an inlet of the Irish sea, on the e. coast of Ireland, in the co. of Down, 5 m. to the s. of Downpatrick, is about 10 m. wide at its entrance, and forms a long curve into the shore, with a uniform breadth of about 2½ miles. Here, in 1846, the steamship *Great Britain* was stranded, but was got off in the following year without having suffered any very serious damage.

DUNE'DIN, the capital of the province of Otago, in New Zealand, is situated in lat. 45° 50′ s., long. 170° 36′ e., on the e. side of South island, towards its southern extremity. It is 200 m. by sea from Lyttleton, and 150 m. from Invercargill. Since its foundation by the New Zealand company, in 1848, the city has rapidly increased in importance; chiefly after the year 1861, when the discovery of extensive gold-fields in the neighborhood caused a sudden increase of population. For 3 years, the city, as well as the province, made great strides in wealth and prosperity; and although subsequently the excessive increase of population was checked by a decrease in the yield of gold, D. has ever since made steady progress. The population of the city proper was in 1874, 18,499, an increase of 3,642 since 1871; inclusive of the suburbs, the population is about 27,000. Within the last few years, the population has been increased by emigration from the colony of Victoria. D. is divided into four wards. It is as well laid out as the hilly nature of its site will allow; it is well paved, and lighted with gas. There are many handsome buildings—about a dozen of them churches; the First Presbyterian church, lately built, being one of the finest in the colony. D. is the seat of an Anglican and a Roman Catholic bishop. Other public buildings are the post-office, hospital, government buildings, mechanics' institute, etc.; and the inhabitants of the city possess places of recreation in the Vauxhall gardens, botanical gardens, and the grounds of the acclimatization society. Steamers sail regularly between D. and Melbourne; and railways are being constructed both to the n. and s., already extending to Invercargill, 110 m. to the south-west. Several daily and weekly newspapers are published. The principal articles of export are grain, potatoes, and wool—the last being by far the most important. The rapid extension of the wool traffic has indeed been marvelous. Between 1853 and 1859, the quantity exported had risen from 5,000 lbs. to 900,000. In 1873–74, it had increased to 15,797,779 lbs., valued at £959,451.

DUNES, from the same root as dun (q.v.), a hill, the name given to the sand-hills or mounds which stretch less or more along the sea-coast of the Netherlands and n. of France. These D. are a natural curiosity. "As if anxious to save the low countries from tidal inundation, nature has for centuries been energetically working to increase the magnitude of the mounds on the coast. At low-water, when the beach is exposed to the action of the winds from the German ocean, clouds of sand are raised into the air, and showered down upon the country for at least a mile inland; and this constantly going on, the result is, that along the whole line, from Haarlem to about Dunkirk or

Calais, the coast consists of sandy mounds of great breadth, partially covered with grass and heath, but unfit for pasturage or any other purpose, and these are the bulwarks which protect the coast. In some places, these D. look like a series of irregular hills; and when seen from the tops of the steeples, they are so huge as to shut out the view of the sea. The traveler, in visiting them from the fertile plains, all at once ascends into a region of desert barrenness. He walks on and on for miles in a wilderness such as might be expected to be seen in Africa, and at last emerges on the sea-shore, where the mode of creation of this singular kind of territory is at once conspicuous. Loose particles of sand are blown in his face; and as he descends to the shore, he sinks to the ankle in the drifted heaps. In some parts of these dreary solitudes, the sandy soil has been prevented from rising with the wind and injuring the fertile country, by being sown with the seeds of a kind of bent-grass, and in a few spots fir-trees have been successfully planted."—*Tour in Holland*, by W. Chambers. The English term *down* (q.v.) has a similar meaning.

DUNFERMLINE, a royal burgh in Fife, of the western district of which it is the chief town. It is the seat of the sheriff courts of the district, which are held twice a week during the session. The town is situated on a long swelling ridge, 3 m. from the firth of Forth, and 16 m. w.n.w. from Edinburgh. It stands 300 ft. above the mean level of the firth, and from the s. has an imposing appearance. The date of its origin is not known, but it was a place of note before the end of the 11th century. Here, king Malcolm Canmore and his queen, St. Margaret, between the years 1070 and 1093, founded an abbey for Benedictines brought from Canterbury. In 1303–4, Edward I. of England wintered here, the buildings being then described as capable of accommodating three kings and their suites. In 1588, D. was created a royal burgh by James VI. David II., James I. of Scotland, and Charles I., were born here; and Malcolm Canmore, his queen Margaret, Edgar, Alexander I., David I., Malcolm the maiden, Alexander III., Robert Bruce, his queen Elizabeth, and nephew Randolph, Annabella, queen of Robert III., Robert, duke of Albany, governor of Scotland, were buried in the abbey and its precincts. The tomb of Robert the Bruce was discovered at the building of the new church, which was opened in 1821. The skeleton of the king was disinterred, and a cast was taken of the cranium. Some interesting fragments of the ancient regal and ecclesiastical magnificence of D. still remain. What is called Malcolm Canmore's tower is a mass of shapeless ruins, but the s. wall of the palace of the Stuarts still exists, overhanging the romantic glen of Pittencrief, a noble wreck, with massive flying buttresses. Of the abbey, the frater hall or refectory, and a tower and arched gateway, still remain. The nave of the abbey church, consecrated in 1150, is in the Romanesque style, 106 ft. long, and 55 wide. The choir, built about 1250, a fine example of the first pointed style, was taken down in 1818–21, when it was replaced by what is now the parish church, surmounted by a square tower 100 ft. high, round which is the inscription, in open hewn capital letters, "King Robert the Bruce." The modern history of D. is chiefly remarkable in connection with the rise of Scottish dissent, Ralph Erskine and Thomas Gillespie having respectively been founders of the Seceder and Relief bodies, now joined under the name of United Presbyterians. The staple trade of the town is damask linen-weaving, which took its rise about the beginning of last century. There are establishments for the spinning of linen yarn, and several large factories where steam and hand loom weaving is carried on. There are likewise large collieries and lime-works, iron foundries, breweries, dye-works, and fire-clay works. See DAMASK. The public buildings are, town-house and county buildings, each having a spire, and the prison, poor-house, and music hall. There are eight fairs, a monthly cattle-market, and one weekly market for grain and country produce. Pop. of parish '71, 23,313, of which the town contains 14,963. It joins with Stirling, Inverkeithing, Queensferry, and Culross in returning a member to parliament.

DUNFISH, codfish cured so that they have a dark or dun color. They are split and partially salted, piled away in a dark place, covered with eel-grass, and pressed. The process gives them a peculiar flavor.

DUNGANNON, a parliamentary and municipal borough in the east of Tyrone, near a tributary of the Blackwater, 11 m. n.n.w. of Armagh, and 8 m. w. of lough Neagh. It lies on a hill-slope, in a densely peopled district, with high mountains to the west. It is well built, and consists of a square with diverging streets. In the vicinity are the largest lime-quarries and collieries in Ulster. The chief manufactures are linen, coarse earthenware, and fire-brick. Pop. '71, 3,886. It sends one member to parliament. It was the chief seat of the O'Neils, the kings of Ulster, till 1607. Its castle was destroyed by the parliamentary forces in 1641.

DUNGARVAN, a parliamentary and municipal borough, seaport, and bathing-place, Waterford co., Ireland, 25 m. w.s.w. of Waterford. The pop. in 1871 was 6,520, chiefly engaged in hake, cod, herring, and other fisheries. The chief exports are grain, butter, cattle, and fish. Vessels of more than 250 tons cannot discharge at the quay. D. has the remains of an Augustinian abbey, founded in the 7th c. by St. Garvan. It has besides the remains of walls built by king John, who also built the castle, now used as barracks.—Dungarvan bay is 3 m. wide, about the same in length, and 1 to 5 fathoms deep.

DUNG BEETLE, the common name of many coleopterous insects of the tribe *scarabæides*, which feed upon the dung of animals, and for the most part live in it. They are found in all parts of the world. Many of them belong to the section of *scarabæides* called *coprophagi* (Gr. dung-eaters); but others, as the DOR, or SHARD-BORN BEETLE (*geotrupes stercorarius*), to the section called *arenicoli* (Lat. sand-dwelling), distinguished by peculiarities in the antennæ, mandibles, etc. Neither section, however, consists exclusively of insects entitled from their habits to be called dung beetles, some of the *coprophagi* feeding chiefly on marine vegetables in a state of putrescence, and some of the *arenicoli* on the roots of plants. The DOR is one of the most common British beetles; it is of a stout form, less than an inch long; black, with brilliant metallic and blue reflections on the under surface; it may often be heard droning through the air towards the close of the summer twilight, and finds its way with rapidity and certainty to cow-dung, on which it feeds, and under which it burrows, making a large cylindrical hole, often of considerable depth, and depositing therein its eggs, enveloped in a mass of dung. These habits—more or less modified—are shared by many other species, which thus not only hasten the removal of what would otherwise become offensive on the surface of the ground, but even distribute it in the soil, where it affords nourishment to plants.—The sacred beetle or scarabæus (q.v.) of the Egyptians (*scarabæus sacer*, or *ateuchus sacer* of modern entomologists) is a true D. B., one of the *coprophagi*, in size and color much resembling the dor. It is found not only in Egypt, but in the s. of Europe and w. of Asia, and deposits its eggs in dung, which it rolls into little balls for the purpose. A nearly allied insect (*gymnopleurus pilularius*), a native of North America, is known as the TUMBLE-DUNG BEETLE, from its habit of rolling globular pellets of dung to the place where they are to be buried in the earth. Several individuals sometimes combine their strength in this curious operation, which is performed by the hind-feet pushing backwards.—The dor, and some other dung beetles, simulate death to deceive their enemies when they apprehend danger, not, like many insects, by contracting their bodies as much as possible, and drawing in their legs, but by stretching every part out to the utmost, and rigidly fixing themselves in that position. Crows and other birds are supposed to prefer them in a living state.

DUNGEON. See DONJON.

DUNGLISON, ROBLEY, LL.D., 1798–1869; b. England, educated in Germany, and called to the chair of medicine in the university of Virginia; afterwards professor in the university of Maryland, and in the Philadelphia medical college. He was a diligent student, and enjoyed a high reputation for benevolence. He was the author of a large number of excellent medical books, among which are a *Medical Dictionary* and *Therapeutics and Materia Medica*. The dictionary is a standard work of its class.

DUNKELD, a city and burgh of barony in the e. of Perthshire, 15 m. n.n.w. of Perth. It lies in a deep romantic hollow, on the great e. pass (of Birnam) to the Highlands, on the left bank of the Tay, across which it communicates with the s. by a handsome bridge, built in 1809 by the duke of Athole. It is environed by dark-wooded and craggy mountains. Pop. '71, 839. D. is a place of great antiquity, dating probably from the 7th or 8th century. About the year 1130, king David I. made it the seat of a bishopric, of which the Culdees of the ancient abbey were the chapter. The choir of the cathedral, chiefly in the first pointed style, was built between 1318 and 1337; the nave, in the second pointed style, was built between 1406 and 1464; and the tower and chapter-house, also in the second pointed style, were built between 1470 and 1477. The choir is now the parish church. The nave, which is in ruins, contains one or two ancient monuments. The monument of the wolf of Badenoch (Alexander Stuart, earl of Buchan, who died in 1384) lies in the vestibule. The duke of Athole's grounds, unsurpassed in Scotland for extent and beauty, lie on the w. and n. of D., and include the cathedral; Craig-vinean and Craig-y-Barns; 50 m. of walks, and 30 m. of drives; falls of the Bran (upper one, 80 ft.), near Ossian's hall at the Rumbling bridge; and 20 sq.m. of larch-wood, including the first two larches planted in Britain (in 1737). D., in ancient times, is said to have been the seat of the Pictish kings. It was the seat of a diocese from 1127 to 1688. Three m. s. of D. stood Birnam wood, so famous in connection with the fate of Macbeth.

DUNKERS, or TUNKERS. See BAPTISTS, GERMAN.

DUNKIRK, a village on lake Erie, in Chautauqua co., N. Y., reached by the Lake Shore and Michigan Southern railroad; 40 m. w. of Buffalo. It is at the w. end of the New York and Erie railroad; pop. of township, '75, 7,665. Dunkirk is a port of entry, with a good harbor, and has a large lake trade by steam and sailing vessels. In the town are an opera house, a dozen or more churches, an orphan asylum, a monastery, a public hall, the extensive repair-shops of the Erie railroad, locomotive works, iron works, and other factories. There is a horse railroad to the village of Fredonia.

DUNKIRK, or DUNKERQUE, the most northerly seaport and fortified t. of France, stands on the eastern shore of the strait of Dover, in the department of Nord, its distance from Paris being in a direct line about 155 m. n., and from Lille about 43 m. n.w. The town, which is connected by railway and canal with the principal manufacturing centers of Belgium and France, is surrounded by ramparts and ditches, and is defended

by a citadel. It is well built, the streets spacious and well paved, the houses chiefly of brick. Its quay and pier, its church of St. Eloi—a Gothic structure, having a handsome though rather incongruous frontispiece in its Corinthian portico—its town-hall, barracks, college, and theater, are the principal architectural features. The harbor of D. is shallow, and the entrance difficult, but the roadstead is large and safe. D. has manufactures of soap, starch, beer, beet-root sugar, cordage, and leather; also metal foundries, distilleries, salt refineries, and ship-building yards. Forming as it does the outlet for the great manufacturing department of Nord, its trade by sea is very considerable. Since becomnig a free port, it has also carried on a good trade in wine and liquors. Its cod and herring fisheries are actively prosecuted. The immediate vicinity of D. has a dreary and uninteresting appearance. Pop. '76, 35,012.

D. is a place of considerable historic interest. It owes its origin, it is said, to the church built by St. Eloi in the 7th c., in the midst of a waste of sand-hills or dunes, and hence its name, "Church of the Dunes." D. was burned by the English in 1388, taken by them under Oliver Cromwell in 1658, but sold to Louis XIV. by Charles II. for a sum of money in 1662. By the treaty of Utrecht in 1715, the French were compelled to destroy the fortifications of D., which were again restored, however, in 1783. In 1793, the allies under the duke of York laid siege to D., but were compelled by the French to retire, after having suffered severely. D. was made a free port in 1826.

DUNKLIN, a co. in s.e. Missouri, on the Arkansas border; 700 sq.m.; pop. '70, 5,982—166 colored. The surface is mostly prairie and swamp, with moderate fertility. Agriculture is the chief business. Co. seat, Kennet.

DUNLAP, WILLIAM, 1766–1839; b. N. J.; a painter and author. His early life was devoted to painting, interspersed with literary and theatrical work. He wrote a number of plays, and published a *History of the American Theater; Arts of Design in the United States;* and a *History of the New Netherlands.* He was one of the founders of the New York academy of design.

DUNLIN, or PURRE (*tringa alpina*, *T. cinclus*, or *T. variabilis*), a bird of the family *scolopacidæ* (snipes, etc.), and of the large group to which the names sandpiper and stint are variously given. It is not quite 9 in. in length from the extremity of the bill to that of the tail. The plumage undergoes great variations in summer and winter. It is a very widely diffused bird. In summer, it frequents even the desolate shores of Melville island. It is to be seen in autumn and winter on the shores of Britain and of most parts of Europe; often in very great numbers on sandy or muddy sea-shores; and is equally common on those of America from the gulf of St. Lawrence to the gulf of Mexico. It exhibits great restlessness and activity in running about, searching and probing for its food. "When flying in great autumnal flocks, its aërial movements are extremely beautiful, each individual of the vast assemblage yielding so instantaneously to the same impulsion as to exhibit alternately the upper and the under surface of the body, so that we have for a time a living moving cloud of dusky brown, and then a brilliant flash of snowy whiteness."

DUNMORE, a borough in Pennsylvania, Luzerne co., near Scranton; pop. '70, 4,311. Coal mining is the chief business.

DUNMOW FLITCH OF BACON, a prize instituted at Dunmow, in Essex, in 1244, by Robert de Fitzwalter, on the following conditions: "That whatever married couple will go to the priory, and kneeling on two sharp-pointed stones, will swear that they have not quarreled nor repented of their marriage within a year and a day after its celebration, shall receive a flitch of bacon." The prize was first claimed in 1445, two hundred years after it had been instituted. After 1751, up to which date only five presentations had taken place, the flitch was not again claimed till 1855. The tenth occasion of awarding the flitch occurred in 1876.

DUNN, a co. in n.w. Wisconsin on Chippewa and Red Cedar rivers; 864 sq.m.; pop. '70, 9,488. Productions, grain, hay, butter, etc. Co. seat, Menomonee.

DUNNAGE, on shipboard, is a name applied to miscellaneous fagots, boughs, bamboos, old mats or sails, and loose wood of any kind, laid in the bottom of the hold to rest the cargo upon; either to keep the ship in trim or to preserve the cargo from damage by leakage.

DUNNET HEAD, a rocky peninsula, 100 to 600 ft. high, the most northerly point of Scotland, on the n. coast of Caithness, in lat. 58° 40′ n., and long. 3° 21′ west. It consists of upper old red sandstone, resting on the middle flagstone of the same system. It is frequented by various species of sea-fowl, among which is the puffin.

DUNNING, JOHN, Lord ASHBURTON, 1731–83; an English lawyer. His fame began in 1762 with his *Defense of the United Company of Merchants of England trading to the East Indies, and their Servants, particularly those at Bengal, against the Complaints of the Dutch East India Company to his Majesty on the Subject.* In 1763, he further distinguished himself in the defense of John Wilkes, whose cause he conducted throughout. In 1766, he was chosen recorder of Bristol, and the next year was appointed solicitor-general. After 1771, he was in the opposition, making many powerful speeches in parliament. In

1782, he was appointed chancellor of the duchy of Lancaster, and about the same time was raised to the peerage.

DUNNOCK. See HEDGE-SPARROW.

DUNNOTTAR CASTLE, the ancient seat, now in ruins, of the Keiths, the earls marischal of Scotland, on the Kincardineshire coast, a mile and a half s. of Stonehaven. It occupies the top of a rock 3 acres in extent, and 160 ft. high, overhanging the sea, with a deep though dry chasm between it and the mainland, and it is approached by a steep winding path. In 1296, Wallace is said to have taken the rock and the kirk of Dunnottar from the English. During the commonwealth, the regalia of Scotland were hid in the castle from the republican army, and before the garrison surrendered to Cromwell's troops in 1651, the regalia were removed and secreted in the church of Kinneff, by Mrs. Grainger, the minister's wife. In the times of James II. and Charles II., D. C. was one of the state prisons, where the Covenanters were confined. It was dismantled after the rebellion of 1715, on the attainder of the last earl marischal.

DUNOIS, JEAN, called the bastard of Orleans, count of Dunois and Longueville, one of the most brilliant soldiers that France ever produced, was b. about the year 1403. He was the natural son of Louis duke of Orleans, brother of Charles VI., and was brought up in the house of that prince along with his legitimate children. D. is said to have been intended for the church, but this is doubted. His first important military achievement was the overthrow of the English at Montargis (1427). He next threw himself into Orleans with a small body of men, and bravely defended the place till the arrival of the famous Joan of Arc, whose religious enthusiasm combined with the valor of the bastard raised the drooping spirits of the French, and the English were obliged to raise the siege. This was the turning-point in the fortunes of the French nation. In 1429, D. and the maid of Orleans won the battle of Patay, after which he marched, with a small body of men, through the provinces then overrun by the English, and took the fortified towns. The capture and death of Joan of Arc arrested for a moment the progress of the French arms, but the heroism of D. was irresistible. He took Chartres, the key of Paris, forced Bedford to raise the siege of Lagny, chased the enemy from Paris, and within a very short period deprived them of all their French conquests except Normandy and Guienne. The next grand series of successes on the part of D. was the expulsion of the English from Normandy. Town after town yielded—Rouen, Harfleur, Honfleur, Caen, Falaise, Cherbourg. This splendid campaign lasted only a year and six days. Not less triumphant was his career immediately after in Guienne; Montguyon, Blaye, Frousac, Bordeaux, and lastly Bayonne, fell into his hands. The English, in fact, were swept out of the country, and the freedom of France from all external pressure permanently secured. Louis XI., on his accession to the throne in 1462, dispatched D. as governor to Genoa, which had yielded itself to France, but soon after, in a fit of jealousy and suspicion, deprived him of all his offices. D. now placed himself at the head of the alliance *Pour le Bien Public*, and by the treaty of Conflans, 1465, recovered all his confiscated estates. He died 24th of Nov., 1468. "There is no name so popular in France as that of D.; there is no hero so national; he labored 25 years for the deliverance of his country, and this *alone*—his sword was never unsheathed, except against the English. He never had a force under him which could enable him to win a victory that might balance Agincourt or Crécy, but the multitude and constancy of his petty successes served the cause of France more effectively than great and sanguinary contests would have done.

DUNOON, one of the most frequented sea-bathing places and summer residences in the w. of Scotland, is situated in the s.e. of Argyleshire, on the w. side of the firth of Clyde, 9 m. w. of Greenock. A village existed here from a very early date, but a new well-built town, with fine villas around, has of late years sprung up. The pop. of D. in 1871 was 3,756. Dunoon castle, of which only a small part now remains, stood on a conical hill near the pier, and was once a royal palace and strong fortress. The Argyle family once lived here, but the building became a ruin about 1700.

DUNSE, a burgh of barony in the Merse, in the middle of Berwickshire, the largest t. in the co., on an eminence on the Whitadder, 44 m. s.e. of Edinburgh, and 13 w. of Berwick-on-Tweed. Pop. '71, 2,618. To the n. of the town is Dunse Law, 630 ft. high.

DUNSINNANE, one of the Sidlaw hills, in the e. of Perthshire, 1114 ft. high, 7 m. n.e. of Perth, and looking towards Birnam hill (q.v.). On the top are the remains of the rampart and fosse of an ancient fortification, popularly called Macbeth's castle.

DUNS SCO'TUS, one of the most famous and influential of the scholastics of the 14th century. His history is involved in considerable obscurity. England, Scotland, and Ireland all contend for the honor of having given him birth, but without anything to offer in support of their respective claims beyond inference from his name. As to the date of his birth, all that can be said is, that it was in the last half of the 13th century. Whatever was the history of his youth, he entered early the order of Franciscans, studied at Oxford, and soon became professor of theology. His prelections were attended by crowds of auditors, the number of students at Oxford then exceeding 30,000. About 1304, he removed to Paris, then the chief seat of scholastic philosophy, where he taught

theology with great applause. He was especially distinguished for the zeal and ability with which he defended the immaculate conception of the Virgin against Thomas Aquinas. He is said to have demolished 200 objections to the doctrine, and established it by a cloud of proofs. It continued long a point of dispute between the Scotists and Thomists; and it was only in 1854 that the dogma was by papal authority declared a necessary doctrine of the Catholic faith, which it is now heresy to deny. In 1308, D. S. was called to Cologne to oppose the heresies of the Beguin brethren, and there he suddenly died, in the 34th or 43d year of his life. D. S. was mostly opposed to Thomas Aquinas in theological opinions, and held very tenaciously the doctrine of the absolute freedom of the human will, from whose spontaneous exercise he derives all morality. He was a realist in philosophy, and his followers are on that ground opposed to the Occamists, who were nominalists. See the article NOMINALISM. He defended his opinions in the style of dialectic then in vogue, and with an acuteness that got him from his contemporaries the name of Doctor Subtilis. When, however, at the revival of learning, the followers of Duns, or *Dunsmen*, saw that the hair-splitting style of reasoning was going out of fashion, they "raged," as old Tyndal says, "in every pulpit" against the new classic studies, so that the name gradually came to signify not only one opposed to learning, but one slow at learning; hence our word *dunce*, a blockhead. It would be difficult to indicate the nature of his speculative opinions without entering into particulars, nor are his writings as yet sufficiently known and explored for the formation of a decided judgment. The most famous of his works, besides his commentaries on the Bible and on Aristotle, is his Commentary on the Sentences of Peter Lombard, called the *Opus Oxoniense*, of which the *Opus Parisiense* is an abridgment. The chief edition of his works is that of Luke Wadding (12 vols., Lyons, 1639), but it is by no means complete. The controversies carried on so long between the Scotists and Thomists owed their bitterness not so much to zeal for science and religion, as to the jealousy existing between the Franciscans and Dominicans.

DUNSTABLE, a t. in the s. of Bedfordshire, at the e. base of the Chiltern chalk-hills or Dunstable downs, 18 m. s.s.w. of Bedford. It chiefly consists of one main street crossed by another. The houses are mostly of brick, some of them very old. Pop. '71, 4,558. D. is the chief seat of the British straw-plait manufacture, which employs many women. Whiting is also made. In winter, many large larks are caught in the neighborhood, and sold chiefly in London as an article of luxury. Henry I. founded here a priory of black canons, of which the present parish church is a part. D. was in 1110 the scene of some of the earliest theatricals, the subject being the miracles of Catherine, by abbot Geoffry of St. Albans.

DUNSTAN, SAINT, was b. at or near Glastonbury, in Somersetshire, 925 A.D. He was of noble birth, and is said to have been remotely related to the royal family, as well as connected with the church through influential relatives. His early studies, which he pursued with extraordinary assiduity, were superintended by Irish teachers; but besides his professional learning, D. possessed a variety of accomplishments. He was an excellent composer in music; he played skillfully upon various instruments; he was a painter, a worker in design, and a caligrapher; a jeweler, and a blacksmith. While quite a youth he was presented at the court of king Athelstan, who seems to have been delighted with his music; but the courtiers envying the favor of the sovereign, denounced him as a dealer in sorcery, and procured his expulsion from court. D. now began to figure in a new character. Contiguous to the church of Glastonbury, he erected a cell, 5 ft. in length by 2 in breadth, the floor of which was sunk beneath the surface, while the roof, on the outside, was only breast-high, so that he could stand upright in it, though unable to lie at full length. This was at once his bed-chamber, his oratory, and his workshop. It was here that (according to the monkish legends) he had his most celebrated contest with the devil. One evening, while the saint was employed at his forge, the devil thrust his head in at the window, and began to tempt him with some immoral propositions. D. patiently endured the annoyance until his tongs were red hot in the fire, when, snatching them suddenly up, he seized the foul fiend by the nose, and held him till the whole neighborhood resounded with the clamor of his agony. Gradually, D. acquired a great reputation for sanctity; and on the accession of Edmund to the throne in 940, he was recalled to court; but in spite of the exploits and penances which had made his banishment illustrious, he was still opposed by the courtiers, who saw his ambition, and dreaded his talents. A second time D. was dismissed, but the king made him abbot of Glastonbury, and increased the privileges of that monastery. Edred, nicknamed *debilis pedibus* (weak in the feet), who succeeded Edmund in 946, showed D. great favor. The saint now began to distinguish himself as a statesman, and the vigorous policy of Edred's reign is affirmed to have proceeded from the inspiration of Dunstan. If such was the case, then to D. was owing the complete subjugation of the Northumbrian Danes. Edred was succeeded by Edwy in 955, who detested D., and not without reason, for the saint, on the day of Edwy's coronation, had grossly insulted his wife and her mother. Besides, Edwy had long suspected D. of peculation in his charge, and this outrage made his wrath overflow. D. was deprived of his clerical office, his places at court were taken from him, his so-called reform—viz., of compelling the clergy to become celibates—was frustrated, the monks were driven out of

their monasteries, their functions handed over to the secular clergy, and D. himself was banished. He fled to Flanders, narrowly escaping having his eyes put out by the messengers whom the infuriated king had sent after him. After D.'s flight, a rising took place among the Northumbrian Danes, instigated by Odo, archbishop of Canterbury, himself a Dane, and a friend of the expatriated saint. Edgar, the brother of Edwy, was chosen king of the whole of the island n. of the Thames, and D. returned in triumph from his brief exile. Meanwhile, Edwy's beautiful wife, Elgiva, had been seized and murdered, under circumstances of horrid cruelty, by the Mercians, who were armed in the cause of D. and Odo, or, as others say, by the immediate retainers of these churchmen themselves. Edwy himself died of a broken heart, or (according to an old MS. in the Cottonian library) was assassinated, in 958, and was succeeded by his brother Edgar. The latter, as a boy of 15, could exercise little authority: he was long a passive instrument in the hands of D. and his party, who used their power in establishing their cause over the whole island, in enforcing the celibacy of the clergy, and in driving out by main force from all abbeys, cathedrals, and churches, all such married clergymen as would not separate from their wives. At the same time, it cannot be denied that D. and the monks ruled the kingdom with vigor and success, and consolidated the detached states into compacter integrity and union than had ever been known before. The Danish districts of Anglia and Northumbria were divided into earldoms or governments; the fleet of the king was increased to 360 sail, which acted as a most efficient coast-guard, preventing the Norse rovers from making their usual destructive descents on the country. In 960, D. was made archbishop of Canterbury on the death of his friend Odo, when, according to custom, he went to Rome to receive the pall at the hands of the pope. He also induced Edgar to visit in person every part of his dominions annually, when courts of justice were held in the various districts, audiences and feasts given, and appeals heard. The many other beneficial measures of Edgar's reign, such as the reform of the coinage, and the endeavor to extirpate wild animals in the mountainous districts, are generally, and with good reason, attributed to Dunstan. The king, who was zealous for the celibacy of the clergy, was himself one of the most viciously profligate of the Saxon kings; yet D. could wink at his crimes, so long as he himself was allowed to carry out his "religious" schemes. On the death of Edgar, a fierce struggle took place between the partisans of Edward the martyr and his half-brother Ethelred. The cause of the former was espoused by D., who succeeded in placing his favorite on the throne; but the mother of Ethelred, named Elfrida, a beautiful but ferocious woman, caused Edward to be murdered in 979, and D. was compelled to place the crown on the head of Ethelred. The credit and influence of the great monk now declined; his threatenings of divine vengeance were treated with contempt; and soured and exasperated at the triumph of his enemies, he retired to his archiepiscopal city, where he died of grief and vexation, May 19, 988. D. was a man of extraordinary abilities. His vigor, his persistency of purpose, and his stern and unscrupulous disposition, would have elevated him to power in any age; but he possessed, in addition to these qualities, a deep knowledge of the weaknesses of human nature, and a clear and penetrating understanding, which enabled him to see what it was necessary and prudent for a ruler to do. Hence, though despotic to the last degree, he was not blindly so, like a commonplace despot. His ambition was ever under the control of his wisdom and his fixed ideas. But the grand designs of his life—viz., the complete subjection and conformity of the Anglo-Saxon church to that of Rome, and the extension and multiplication of ecclesiastical interests—are not such as excite the admiration of modern times, and all discerning people will regret the success that attended the unpatriotic labors of the saint. That he *was* successful, there can be no manner of doubt. Though personally out of favor at court in the latter years of his life, his efforts to spread his official influence were unceasing. At an early period in his career, he had introduced a new order of monks into the land, the Benedictines, whose strict discipline had changed the character and condition of ecclesiastical affairs, and in spite of the confusion and even opposition thus caused, he persevered to the end. Monasteries continued to be founded or endowed in every part of the kingdom; and such were the multitudes who devoted themselves to the cloister, that the foreboding of the wise Bede was at length accomplished—above a third of the property of the land was in possession of the church, and exempted from taxes and military service. D.'s *Concord of Monastic Rules* will be found in Reyner's *Apostolatus Benedictinorum in Anglia*, fol., Duac. 1626, page 77 of the appendix. Other writings have been attributed to him. See Wright, *Biog. Brit. Lit., Ang.-Sax. Period.* See also William of Malmesbury, Lingard's *History of England*, Kemble's *Saxons in England*, book ii., and *Memorials of St. Dunstan*, edited by W. Stubbs, M.A. (1875), a collection of six biographies of the saint.

DUNSTER, HENRY, d. 1659; b. England; educated at Magdalen college, Cambridge; came to Massachusetts, 1640, and in the same year became the first president of Harvard college. He was esteemed for piety and learning; but was compelled to resign his office, 1654, for having publicly opposed infant baptism.

DUNTON, JOHN, 1659–1733; b. in England, and apprenticed to a bookseller. In 1686, he migrated to New England to sell books. He conducted *The Athenian Mercury*, of which 20 vols. appeared. He was a prolific writer on religion, morals, and politics.

DUODEC'IMAL SCALE (Lat. *duodecim*, twelve) is the name given to the division of unity into twelve equal parts, as when the foot is divided into 12 in., and the inch into 12 lines; or the pound is divided into 12 ounces. This plan of counting has some advantages, as 12 admits of so many divisions into equal parts—viz., by 2, 3, 4, and 6. But the decimal scale, or division into ten equal parts, is now universally recognized as preferable, from its coinciding with our decimal system of notation.—DUODECIMALS is a term applied to a method of calculating the area of a rectangular surface when the length and breadth are stated in feet and inches.

DUODEC'IMO (Lat. *duodecim*, twelve) is that form of volume whose leaf is equal to the twelfth part of a folio—the folio being the large sheet called the *broadside*, folded once. A book is said to be *quarto*, *octavo*, *duodecimo*, etc., because the sheet of which the pages of the book are made up, has been folded into four, eight, twelve leaves, etc. Quarto, octavo, and duodecimo, are almost always written 4to, 8vo, and 12mo.

DUODE NUM. See DIGESTION.

DU PAGE, a co. in n.e. Illinois, traversed by four or five railroads; 340 sq.m.; pop. '70, 16,685. The soil is very fertile, producing grain and fruit in abundance. Co. seat, Wheaton.

DUPANLOUP, FÉLIX ANTOINE PHILIBERT, b. Savoy, 1802; d. Paris, 1878. In 1825, he was ordained a priest; in 1827, was confessor to the young duke of Bordeaux; next year catechist to the Orleans princes; and in 1830, chaplain to the daughter of Louis XVI. In 1849, he became bishop of Orleans, where he first gave full scope to his plan for Christian education. In 1848, he was instrumental in having the first French expeditionary corps sent to the papal states. He was often in conflict with the censor of public worship in France. He opposed papal infallibility, but was prompt to accept the dogma when it had been promulgated. At the close of the war with Germany he was sent as a representative to the national assembly, where he favored a constitutional monarchy, the restoration of the Bourbons, and a complete system of education. He published a number of works on religious subjects.

DUPERREY, LOUIS ISIDORE, 1786–1865; a French navigator and scientist, native of Paris. He served under Freycinet in the voyage around the world (1817–20), in charge of the hydrographic operations. In 1822–25, he was in command of a vessel, making scientific explorations in the Pacific and along the coasts of South America. The later portion of his life was devoted to investigations in terrestrial magnetism. He was a member of the French academy of sciences.

DUPERRON, JACQUES DAVY, 1556–1618; a French cardinal. He was brought up a Protestant, but at the age of 20 abjured, and was appointed reader to king Henry III. He became noted as a pulpit orator, and rose to fame and fortune. Soon after Henry IV. came to the throne, Duperron converted him to the Roman Catholic faith, and after the taking of Paris, went to Rome to induce the pope to remove the interdict laid upon the kingdom. In 1604, he was sent to Rome as chargé d'affaires, and within a month was active in the election of two popes—Leo XI. (who reigned 24 days), and Paul V. While at Rome he was made archbishop of Sens, and soon afterwards a cardinal. Duperron was a zealous advocate of papal prerogative, and a man of great ability and untiring energy.

DU PETIT-THOUARS, ABEL AUBERT, 1793–1864; a French naval officer. From 1837 to 1839, he was circumnavigating the globe; rose afterward to be rear-admiral and commanded the Pacific fleet. In 1842, he placed the island of Tahiti under the protection of France, and the same year extended the protectorate over the Marquesas islands. In 1843, when the English missionaries and the natives of Tahiti rose against French rule, he placed the whole Society group under French domination. At the demand of the English government he was recalled. In 1846, he was made vice-admiral, and in 1849, was elected to the legislative assembly. He wrote *A Voyage Around the World.*

DUPLEIX, JOSEPH FRANÇOIS, 1697–1764; Governor-General of the French establishments in India. He made several voyages to America and India, and displayed remarkable business aptitude. While governor in India his ambition was to extend French possessions, and he was frequently in diplomatic contest and in armed conflict with the English, at the same time endeavoring to win over the native princes. All this was theoretically stopped by the peace of Aix-la-Chapelle; still Dupleix continued his efforts, entering into negotiations for the subjugation of Southern India, and sending troops to the aid of two claimants of the sovereignty of the Carnatic and Deccan, while the English were engaged on the side of their rivals. His scheme failed, but the trouble continued until 1754, when Dupleix was recalled to France. He died in obscurity and want.

DUPLIN, a co. in s.e. North Carolina, watered by a branch of Cape Fear river, and intersected by the Wilmington and Weldon railroad; 670 sq.m.; pop. '70, 15,542—6,766 colored. The surface is level, and the soil sandy, with some fertile tracts. Productions—corn, rice, cotton, etc. Co. seat, Kenansville.

DUPIN, ANDRÉ-MARIE-JEAN-JACQUES, a French statesman and lawyer, was b. 1st Feb., 1783, at Varzy, in the department of Nièvre, and studied in Paris. In 1815, he was elected a member of the chamber of representatives, when he opposed the motion for proclaiming Napoleon II. successor to the throne. During the same year, he published his treatise, *Sur la Libre Défense des Accusés*. The attention excited by this work procured him the honor of defending marshal Ney, and afterwards the English officers, Wilson, Bruce, and Hutchinson, accused of having favored Lavalette's escape. He had also the honor to defend the poet Béranger in 1821. From 1825 to 1829, he was the advocate of the liberal party. In his pamphlet, *La Révolution de* 1830, he endeavored to prove the legal character of this revolution; and on the question being mooted whether the new king should assume the title of Philippe VII., D. declared "that the duke of Orleans was called to the throne not *because* he was a Bourbon, but *although* he was a Bourbon, and on the condition that he should not follow in the footsteps of his predecessors." After having been appointed to various important offices by the new government, D. found it necessary to pass over to the opposition, and was eight times chosen president of the chamber of deputies. On the revolution of 1848, he urged (but unsuccessfully) the chamber to proclaim the comte de Paris king of the French, with the duchess of Orleans regent during his minority. In consequence of the confiscation of the Orleans estates in 1852, D. resigned his place, and retired for a time from public life; but in 1857, he consented to resume his previous office of *procureur-général* of the court of Cassation. He is the author of many important works, mostly on legal questions, among which may be mentioned his *Manuel du Droit Ecclésiastique Français*, which had the high honor of being censured by the congregation of the *Index* at Rome. In 1853 appeared his *Le Morvan; Topographie, Agriculture, Mœurs des Habitants, Etat Ancien, Etat Actuel;* and in 1857, *Règles Générales de Droit et de Morale tirées de l'Ecriture Sainte*. D. died in 1865.

DUPIN, FRANÇOIS-PIERRE-CHARLES, Baron, a French economist, brother to the preceding, was born at Varzy, in the department of Nièvre, 6th Oct., 1784, and educated at the polytechnic school, Paris. During the empire, he was actively employed as an engineer. Between 1816 and 1819, he made several visits to England and Ireland, to study the great works of construction in those countries. The results of his investigations appeared in his *Voyages dans la Grande Bretagne* (6 vols., Paris, 1820–24, with atlas)—a comprehensive statement of the advantages and defects of British internal administration, exhibiting in a popular form a complete view of the roads, canals, aqueducts, bridges, ports, etc., of this country. D. was about this time appointed member of the académie des sciences, and in 1824 was raised to the rank of baron. In 1828, he was elected deputy for the department of Tarn, and he took part with the liberal opposition. After the Feb. revolution of 1848, D. was elected member of the constituent assembly by the department of Seine-Inférieure. After the *coup d'état*, he became a senator of the empire. D. published a multitude of works on geometry, naval affairs, commerce, etc. He died in 1873.

DUPLICATE RATIO. See PROPORTION.

DUPLICATION OF THE CUBE. See DOUBLING THE CUBE.

DUPONCEAU, PETER STEPHEN, LL.D., b. France, 1760, d. Philadelphia, 1844. He was bred to the law, and became secretary to baron Steuben, and with that soldier came to aid the Americans in the revolution. He was with Steuben through the war, and at its close took up his residence in Philadelphia, where, in 1785, he was admitted to the bar. He was offered, but declined, the chief-justiceship of Louisiana. He paid much attention to philology; and in 1819, as chairman of the committee on history, moral science, and general literature of the American philosophical society, he made a report on the structure of the Indian languages. In 1835, the French institute sent him the Volney prize for a similar work. In 1838, he published an essay on the Chinese system of writing. He also wrote on the cultivation of silk, and made efforts to establish its culture in the United States. He wrote on many other subjects, and his contributions to American history were valuable.

DUPONT, JACQUES CHARLES, styled DE L'EURE, a leader of the French liberal party, b. 27th Feb., 1767, at Neubourg, in Normandy. During the periods of the revolution and the empire, he filled several important offices. In 1813, he became a member of the legislative body, and acted as vice-president when this assembly was convoked by Louis XVIII. on the fall of Napoleon. During the hundred days he was elected to represent the department of Eure, and, after the battle of Waterloo, became vice-president of the chamber of representatives. After the revolution of 1830, he was appointed minister of justice, but at the end of six months sent in his resignation, and took his place in the ranks of the opposition. After the revolution of 1848, during the session of the 24th Feb., D. took the president's chair, and so far silenced the tumult of the populace, as to render it possible to appoint a provisional government, of which he was proclaimed president. He died in 1855. His political friends styled him the most virtuous among the virtuous, the Aristides of French liberalism. His disinterestedness was not denied even by his enemies; but he manifested fidelity to his convictions rather than energy of character.

DUPONT, PIERRE, 1821–71; b. at Lyons, the son of a workman of Provins. He was brought up by his cousin, who was priest of Roche-Taillée-sur-Saône, and, after leaving the seminary of Largentières, passed a short time in a lawyer's office. In 1839, he found his way to Paris, where he succeeded in having some of his poems published in the *Gazette de France* and the *Quotidienne*. His first volume of poems, *Les Deux Anges*, appeared in 1841; and in 1847, he made a great hit by his peasant song, *J'ai deux grands bœufs dans mon étable*, which induced him to devote himself to lyrical poetry. Many of his songs, accompanied by airs of his own invention, became very popular. Among the best known are *Le braconnier; Le tisserand*; *La Vache blanche;* and *La chanson du blé.*

DU PONT, SAMUEL FRANCIS, 1803–65; b. N. J.; midshipman in the navy, 1815; lieut., 1826; commander, 1843. In 1845, he commanded commodore Stockton's flagship in the Pacific squadron, and, during the war with Mexico, did service on the California coast, taking a leading part in the capture of Mazatlan. In 1856, he was made capt., and was sent on special duty to China. When the rebellion began, he was in command of the Philadelphia navy-yard. In Sept., 1861, he was appointed flag officer, and given command of the South Atlantic blockading squadron. In Nov., he captured the forts at Hilton Head and Bay Point, the defenses of Port Royal harbor. In 1862, he was made rear-admiral. In April, 1863, he made an unsuccessful attack on Fort Sumter. In the following year, he was retired from active command.

DUPONT DE L'ÉTANG, PIERRE, Count, 1765–1838; a French officer, appointed brigadier in 1793, and gen. of division in 1797. He was with Napoleon at the overthrow of the directory; fought at Marengo; defeated a superior Austrian force at Pozzolo; won further laurels in the Austrian and Prussian campaigns, and, by a singularly bold movement, decided the victory of Friedland. In 1808, he commanded in Spain, where he was compelled to surrender his whole army. For this, he was degraded and imprisoned. On the fall of the emperor, he was restored to liberty and made minister of war, but was soon dismissed. After the second restoration, he became a member of the privy council. He was several times elected to the chamber of deputies.

DUPONT DE NEMOURS, PIERRE SAMUEL, 1739–1817; a French statesman and economist, a prolific writer on questions of finance. In 1772, he was secretary of the council of public instruction of Poland. He came back two years afterwards to assist his friend Turgot in the French administration. With Turgot he went into retirement, where he wrote the memoirs of his friend, and translated Ariosto. In 1782, he was employed in constructing the treaty by which the independence of the United States was recognized. Subsequently he was a member of the council of state, and was appointed commissary-gen. of commerce. During the revolution he favored a constitutional monarchy, but was compelled to flee when the republicans triumphed. During his concealment he wrote his *Philosophy of the Universe*. He was found and imprisoned; but as Robespierre's head fell first, Dupont's was saved. He was one of the council of five hundred, and a thorough reactionist. In 1797, his house was sacked by a mob, and he narrowly escaped transportation. Finding France uncomfortable, in 1799 he and his family emigrated to the United States. In 1802, he returned, but declined to receive any political office, except that he was one of the commissioners to arrange the transfer of Louisiana to the United States. Jefferson, whose love of French democratic institutions was only equaled by his hatred of anything English, requested Dupont to prepare a scheme of national education, which was published in French in 1812. The scheme was never adopted in the United States, but some of its features were embodied in the French code. After Napoleon's first downfall, Dupont became secretary to the provisional government, and on the restoration of the Bourbons, he was made a councilor of state. The return of Napoleon caused him to leave France, and he spent the remainder of his life with his two sons, powder manufacturers, in the state of Delaware.

DÜPPEL, or DYBBÖL, a small fortified t. of the Prussian province of Sleswick-Holstein, in the peninsula of Sundewitt, 16 m. n.e. from Flensburg. During the war between Germany and Denmark, it was bombarded for more than a month by the Prussians, and finally taken, April 18, 1864.

DUPUIS, CHARLES FRANÇOIS, a distinguished French *savant*, was the son of a poor schoolmaster, and was b. at Trie-Chateau, near Chaumont, 16th Oct., 1742. He obtained admission into the college of Harcourt, where he so soon acquired such extensive knowledge that at the age of 24 he was made professor of rhetoric in the college of Lisieux. At the same time he went through a course of law studies, and was admitted an advocate of the parliament. His acquaintance with Lalande introduced him to the study of mathematics and astronomy, and he was led to the thought of explaining mythology by means of astronomy. After several communications in the *Journal des Savans*, appeared his *Mémoire sur l'Origine des Constellations et sur l'Explication de la Fable par l'Astronomie* (Par. 1781). He was now appointed professor of eloquence in the collége de France, member of the académie des inscriptions, and shortly after a member of the commission of public instruction. Although he rather shunned the storms of the revolution, his reputation necessitated his becoming a member of the convention, next of the council of 500, and after the 18th Brumaire, of the legislative body. He was also one of the 48 individuals who formed the nucleus of the institut national. His great work, *Origine de tou-*

les Cultes, ou Religion Universelle (12 vols., Par. 1794), which he had long withheld from fear of offending the religious world, was at last published at the instigation of the Cordeliers' club. This circumstance rendered the book more an object of party bitterness than its own purely scientific character would probably have called forth. It made a considerable impression on France at the time, and no doubt originated the famous commission afterwards appointed by Napoleon to explore Upper Egypt, which D. had pointed out as the general source of southern mythology. No less attention was awakened by his memoirs on the origin and spread of the Pelasgi, and on the zodiac of Denderah (q.v.). In his last work, *Mémoire Explicatif du Zodiac Chronologique et Mythologique* (Par. 1806), he attempts to demonstrate the unity of the astronomical and religious myths of all nations. He died 29th Sept., 1809.

DUPUYTREN, GUILLAUME, le Baron, an illustrious French surgeon and anatomist, was b. at Pierre-Buffière, in Limousin, 6th Oct., 1777; educated at the collége de la Marche in Paris; and on the formation of a new school of medicine there in 1794, was appointed to the office of *prosecteur*. In 1801, he was appointed *chef des travaux anatomiques*, and applied himself with intense ardor to pathological anatomy. In 1803, he was appointed assistant-surgeon, and later, in 1815, first surgeon in the Hôtel-Dieu. In 1813, he became professor of surgery to the medical faculty, an office which he exchanged, in 1818, for the professorship of clinical surgery at the Hôtel-Dieu. In 1820, Louis XVIII. conferred on him the title of baron, and in 1823, appointed him royal surgeon. He died at Paris, 8th Feb., 1835. D. possessed extraordinary penetration in diagnosis, a penetration that was generally justified by his bold and skillful operations, and an immovable firmness of nerve. He was the inventor of many ingenious modes of surgical operation and of various surgical instruments. He likewise made several important discoveries in pathological anatomy; and although he wrote very little, almost nothing indeed, he formed a large school of enlightened surgeons in his native country. Among his works may be mentioned *Leçons Orales de Clinique Chirurgicale faites à l'Hôtel-Dieu* (4 vols., Par. 1830–34), published by some of his students; and his *Traité Théorique et Pratique des Blessures par Armes de Guerre*, edited by Paillard and Marx (2 vols., Par. 1834).

DUQUESNE, ABRAHAM, Marquis, one of the most eminent naval officers of France, was b. at Dieppe in 1610, and trained under his father, the captain of a ship, for the naval service. In the war between France and Spain, he brilliantly distinguished himself at Corunna, Tarragona, Barcelona, and other places. During the minority of Louis XIV., when the navy of France was inactive, he entered the service of Sweden, which was then at war with Denmark. D. defeated the Danish fleet near Gothenburg in 1643, was elevated to the rank of vice-admiral, and by a succession of victories over the united fleets of Denmark and Holland, forced Denmark to conclude peace. He then returned to France, where he found the Spaniards prepared to support Bordeaux, which had declared itself for the party of the *Fronde* in 1650. D. immediately collected a squadron at his own expense, and compelled Bordeaux to submit. He was next employed in punishing the pirates of Algiers and Morocco who infested the Mediterranean. On the revolt of Messina against the Spanish government, France sent him to support the insurgents in the Mediterranean. With a small force, D. gallantly opposed the united fleets of Spain and Holland, commanded by De Ruyter, and in April, 1676, completely defeated his enemies off the coast of Sicily, in the vicinity of Mt. Etna. De Ruyter died a few days after. France thus obtained possession of the island of Sicily. Louis XIV. rewarded D. with the title of marquis and a considerable estate. On the revocation of the edict of Nantes, D. was made the only exception to the general decree of banishment issued against all Protestants. His last achievement was the humiliation of Genoa. D. died at Paris, 2d Feb., 1688. See *Duquesne et la Marine de son Temps*, by Henri Plon (Paris, 1872).

DUQUOIN, a city in Perry co., Ill., at the junction of the Illinois Central and the St. Louis and Southern Illinois railroads; 77 m. n. of Cairo; pop. '70, 2,212. It is in a rich coal region, and has a large trade in shipping tobacco, wool, etc.

DU'RA DEN, between Cupar and St. Andrews, in Fifeshire, a small glen through which runs a tributary of the Eden, has become famous on account of the numerous and beautifully preserved fossil fish entombed in its yellow sandstone. This sandstone is one of the upper beds of the old red sandstone. It is developed in D. D. to a thickness of 300 or 400 ft., and is rich in the remains of ganoid fishes. They occur in clusters and detached groups, sometimes crowded together in an extraordinary manner, so that nearly a hundred specimens have been counted on a single slab about five feet square. They are found only in one thin layer, no fragment of skeleton or scale having been obtained in any other portion of the sandstone. The specimens are beautifully preserved; they often exhibit the rounded plump form of the living animal, in some instances not a scale being displaced; the scales retain their original glistening enamel, very different from the white chalky appearance they present in other localities. The specimens consist of two species of *holoptychius*, viz., *Andersoni* and *Flemingii;* also of *dipterus, platygnathus, phaneropleuron Andersoni, glyptolæmus, glyptopomus,* and *pamphractus.* See *Dura Den,* by J. Anderson, D.D.

DURA MATER, the hard external membrane that envelops the brain. See NERVOUS SYSTEM.

DURA'MEN, or HEART-WOOD, in botany, the inner and fully ripened wood of exogenous trees. The division is often very marked between the *D.* and the *alburnum* (q.v.) or sap-wood, the D. being more dense and compact, and its tubes thickened and filled with peculiar secretions of the plant, so that juices no longer freely flow through them. It is also very frequently of a darker color than the alburnum: in ebony, it is black; and some other trees are remarkable for the peculiar color of their wood, which appears, however, only in the D., and not in the alburnum. As timber, it is much more valuable and durable than the alburnum; and the distinction is as well known to the carpenter or cabinet-maker as to the botanist.

DURAN, AUGUSTIN, 1789–1862; a Spanish poet, educated to the law in the university of Seville, and admitted as an advocate. In 1834, he was secretary of the board for the censorship of the press, and soon afterwards had a place in the national library, of which he became a director. He published a discourse on the influence which modern criticism had exercised on the ancient Spanish theater, a number of volumes of old romances, and a collection of old Spanish comedies. He is best known by his poem *The Three Citron Trees of the Orchard of Love.*

DURANCE, a river in the s.e. of France, rises in the department of the Hautes-Alpes, near the base of Mont Gènèvre, one of the peaks of the Cottian Alps. It flows through the department of the Basses-Alpes in a southerly direction; then curving westward, it proceeds towards the Rhone, forming the boundary between the departments of Vaucluse and Bouches-du-Rhone, and joins that river about 3 m. below Avignon. Its principal affluents are the Buech and the Calavon from the right; and the Ubaye, the Bleone, the Asse, and the Verdon from the left. Its total length is about 180 m.—no part of its course is navigable. Its current is swift and impetuous, and carries down with it great quantities of sand and pebbles. Large quantities of timber are floated down from the forest districts upon its banks to Arles, and thence to the Mediterranean. An aqueduct 51 m. long has been recently constructed from the D. to Marseilles. This great work not only supplies Marseilles with water, but affords water-power for driving machinery, and irrigates an otherwise parched area of 25,000 acres.

DURAND, ASHER BROWN, 1796–1874; b. N. J. He was at first a watchmaker, but in 1812 was apprenticed to an engraver in New York, becoming a partner in the business at the expiration of his time of service. His large engraving of Trumbull's *Declaration of Independence*, which cost him three years of work, brought him into notice, and thenceforward his path was one of success. In 1855, he quitted engraving and turned his entire attention to painting, at first portraits only, but later of natural scenery, in which he was ranked among the first of artists. He was for several years president of the New York national academy of design. He translated several works on art.

DURAN'GO, a state in n. Mexico, s. of Chihuahua, and w. of Coahuila; 42,498 sq.m.; pop. 190,846. The w. part is mountainous, but the e. is level and fertile. In the n.w. is a large and desolate area inhabited only by Indians. The climate is cold on the mountains, but generally temperate on the plains. Sugar cane, tropical plants and fruits, cotton, flax, wheat, and other cereals are grown. There are many rich gold mines; some deposits of silver; and copper and lead are abundant. The chief town is the city of the same name.

DURANGO, or GUADIANA, and also sometimes called CIUDAD DE VICTORIA, in honor of the first president of the Mexican confederation, is a city in Mexico, and stands in the Sierra Madre, at the elevation of 6,848 ft.—almost a mile and a quarter—above the level of the sea. Lat. 24° 2′ n., long. 104° 3′ west. It is near the Culiacan (q.v.), being 150 m. to the n.w. of Zacatecas. It is regularly built, with a cathedral and other churches, and with convents, a theater, and a mint, and the inhabitants, 14,000 in number, carry on manufactures in iron, wood, wool, and leather. The city gives name to a department containing 42,500 sq.m., and in 1873, occupied by 190,846 inhabitants.

DURANGO, sometimes called CIUDAD DE VICTORIA, or GUADIANA, a city of Mexico, capital of the state of Durango, near the foot of the s. slope of the Sierra Madre, 7,295 ft. above the sea-level; pop. 12,449. The city was founded in 1559 by Alozo Pacheco as a military post for the control of the natives. It is the center of a Roman Catholic bishopric, and has a cathedral, churches, a hospital, a penitentiary and other government buildings, a bull-ring, and a cock-pit. The city is well supplied with water by warm and cold springs. There is trade with the adjoining states, a mint, a gold refinery, glass works; and cotton, woolen, leather, and tobacco manufactories.

DURAN'TE, FRANCESCO, 1684–1755; an Italian composer, and one of the founders of the Neapolitan school of music. He was chapel-master in Naples, and in 1742 was at the head of the Conservatorio Santa Maria di Loretto in that city. He had unexampled fame as a teacher, and the most celebrated masters of the earlier school of Italian opera were among his pupils. Under Durante the Neapolitan school reached the climax of its celebrity, and it was in this school that the great traditions of Italian vocal art were established. As a composer he adhered to the severe style of the early Italian masters.

DURAZZO (called by the Turks *Dratsch*, and by the Slaves *Durtz*), a maritime t. of Albania, European Turkey, is built on the rocky peninsula of Peli, in the Adriatic. Lat. 41° 19′ n., long. 19° 27′ east. It is fortified, and is a place of considerable antiquity.

Its situation in a fertile district gives it an export trade in grain, oil, etc.; but in recent years, owing to partial failures in crops, and disease in olives, the exports have been small. D. has large imports of British manufactured goods; and also of sugar, coffee, rice, soap, and iron. It contained in 1871 only 1200 inhabitants.

D. is the ancient *Epidamnus*, which was founded about 627 B.C. by a conjoined band of Corcyræans and Corinthians under one Phaleus, a Heracleidan. It became a great and populous city, but was much harassed by the internal strifes of party, which ultimately led to the Peloponnesian war (q.v.). Under the Romans it was called Dyrrachium (whence its modern name), and became the seat of a Roman colony, and an important landing-place for those sailing from Brundusium in Italy to Greece. Here Pompey was for some time beleaguered by Cæsar. Dyrrachium attained its highest consequence about the 4th c., when it became the capital of the Byzantine eparchy of New Epirus. After being possessed successively by the Ostro-Goths, the Bulgarians, the Normans, and the Venetians, and been destroyed by an earthquake, it was finally conquered by the Turks in 1502, in whose possession it still remains.

D'URBAN. See NATAL.

DURBHANGAH, the capital of a district of the same name in Bengal, India, in the province of Behar, Patna division. Pop. in 1872, 47,450.

DURBIN, JOHN PRICE, D.D., 1800–76; b. Ky. At an early age he entered the Methodist itinerant ministry, studied while preaching, graduated at Cincinnati college, and was made professor of languages in Augusta college, Ky. In 1831, he was chaplain to the U. S. senate; in 1832, editor of the *Christian Advocate and Journal;* in 1834, president of Dickinson college; subsequently traveled in Europe, and in 1844 was prominent in the great slavery discussion which divided the church. He left the college in 1845, and was pastor in Philadelphia and presiding elder of the district. From 1850 to 1872, he was secretary of the missionary society, and to his exertions that society owes much of its success. He published *Observations in Europe, principally in France and Great Britain*, and a similar work on Palestine, Syria, and Egypt.

DÜREN (the Roman Marcodurum, whence its former name, Mark-Duren), an ancient t. of Rhenish Prussia, situated on the Roer, 18 m. e. of Aix-la-Chapelle. It is surrounded with walls, and has several churches remarkable for their fine architecture. D. has important manufactures of woolen cloths, iron and steel ware, paper, soap, leather, oil, etc. In the vicinity are iron foundries and other factories worked by water-power, obtained from the Roer. Pop. '75, 14,542. Here Charlemagne, on his way to attack the Saxons, held diets in 775 and 779, A.D. After an obstinate resistance, D. was taken and burned by Charles V. in 1543. In 1794, the French made it the capital of the department of the Roer; but in 1814 it was handed over to Prussia.

DÜRER, ALBERT, the father of the German school of painting, "the prince of artists," as his countrymen loved to call him, was born at Nürnberg in 1471, according to an entry in his father's day-book, "on the day of St. Prudentius, on a Friday of the holy week." His father was a humble pious goldsmith, of whom the great painter said: "His daily speech to us was, that we should abound in love to God, and act faithfully towards our neighbor." D. was carefully educated and instructed by his father in the goldsmith trade, and at 15 executed a piece of work in chased silver representing the seven "falls of Christ"—in reference to the tradition that Christ fell seven times while bearing his cross to Mt. Calvary. Even as a child, drawing was his delight, and he was wont to astonish by the exactness with which he drew parts of the human body, and even whole figures, also lines and circles at the first stroke, without ruler or compass. His father therefore bound him apprentice, in 1486, to Michael Wohlgemuth, the chief Nürnberg artist, with whom he served three years. From 1490 to 1494 he traveled in Germany and the Venetian states; and on his return, his father "bargained" with Hans Frei, a skillful mechanic of Nürnberg to give him to wife his daughter Agnes, who turned out a perfect Xantippe, with nothing to recommend her but beauty and 200 florins, who embittered the whole course of his life, and, as his life-long friend Pirkheimer asserts, hastened his death. After receiving his diploma with all the honors and rights of a master, obtained for his famous drawing of Orpheus, he went to Venice in 1505, where he painted a picture of the martyrdom of St. Bartholomew, and one of Adam and Eve, afterwards bought for the gallery at Prague. He also visited Bologna, where it is said that he met with Raphael, who esteemed him highly, and that each painted for the other his portrait. After this journey, his fame spread widely, and the Emperor Maximilian appointed him court painter, with an annuity of 100 florins; and Charles V. confirmed the same in a document still to be seen in the Nürnberg archives. In 1520, he visited the Netherlands with his wife and their maid-servant; and they were splendidly entertained at Antwerp and Bruges by the painters, a costly dinner being served on vessels of silver, the whole party conducting them home late in the night by the light of many torches. His expenses were often defrayed at the inns, and he was escorted free from city to city. He says in his journal: "The people did obeisance unto me as if they were leading some great lord." D. warmly embraced the doctrines of the Reformation; and his journal contains a long lamentation and prayer on hearing that Luther had been carried off to the castle of Wartburg. At Antwerp he records: "I was now overcome by a strange sickness, of which I never yet heard from any man."

This was in 1521, and the "strange sickness"—no other than consumption—took yet seven years to consume his strong frame; he d. in his native city, 6th April, 1528, in his 57th year.

D's facility was almost incredible. He *thought out* his works, and then executed them without sketch, and never altered a line. Of his coloring, Fuseli says: "Düer excelled Raphael in juice and breadth of coloring as much as Raphael excelled him in every other quality." His drawing was perfect. So quaint were the presentments of his genius, he may be called the Chaucer of painting. In his portraits, he not only caught the expression, but delineated character and passion. D. was the inventor of the art of etching. He found wood-engraving in its infancy, and raised it to be a pattern for all times; he also discovered the method of bringing out wood-cuts in two colors. Historical and other paintings by D. are to be seen at Vienna, Munich, Prague, Dresden, and Nürnberg. The oldest of his pictures extant is the portrait of himself of the year 1498, in the Florentine gallery. His engravings and wood-cuts are so numerous, that with all his surpassing diligence it is known that for many of them he only gave the designs: 262 wood-cuts are known marked with his name, the most famous of which are the "Great Passion," the "Little Passion," his favorite work, the "Revelation of St. John," and the series called the "Triumph of Maximilian," a copy of which is in the Advocates' Library in Edinburgh. In the British museum, there is a volume with more than 200 original drawings by D., formeriy in the collection of sir Hans Sloane, also an exquisite carving in hone-stone, of the birth of St. John, and a number of engravings, bequeathed by Mr. Nollekens. His own list of his works enumerates 1,254 pieces.

In the last three years of his life he published works on perspective and measurement, on fortification, and on human proportion, of which last he only lived to correct the first volume. His life has been written by Heller, Roth, Campe, and others; in English by W. B. Scott and Mrs. Heaton. Deeply religious and reverent, he was also of a cheerful temperament, and was long chief magistrate of his native t., where there is a brass statue of him, designed by the famous sculptor Rauch, and his house is still to be seen at the corner of a street called by his name.

DU'RESS, in English law, is the plea of a man who has obliged himself to pay or perform, or who has committed a misdemeanor, that he was constrained to do so, and therefore ought to be free from the consequences. There is both *duress* of *imprisonment* and D. *per minas*.

DURESS (*ante*), a legal term, signifying personal restraint, or fear of personal injury or imprisonment, imposed upon a person to constrain him to perform some act injurious to himself or another; as when a man's life is threatened or his liberty restrained to compel him to sign a bond, or to relinquish some right, or to commit a misdemeanor. A bond signed under D. is voidable in law. The same is the case when the violence or the threat thereof is exercised on the wife, or husband, or other near kindred of the contracting party. The violence or threats must be such as are fitted to operate upon a person of ordinary firmness and to inspire a genuine fear. If a man's goods be in D.—that is unlawfully detained—and he pay money under protest to release them, a suit will lie for its recovery.

DURFEE, JOB, LL.D., 1790–1847; b. and d. in R. I. He graduated at Brown university in 1813; studied law; was elected to congress in 1820, and served four years; was chosen a number of times to the state legislature, and in 1828 was speaker of the lower house. In 1833, he was appointed associate justice of the state supreme court, and became chief-justice in 1835. He was the author of *What Cheer*, a poem in nine cantos, and of *Panidea*, a treatise to prove the presence of God throughout all nature.

D'UR'FEY, THOMAS, a writer of plays and poems in the reign of Charles II., with whom he was a favorite for his wit, liveliness, and songs. In literature, he is best remembered for his collection of songs, entitled *Pills to Purge Melancholy*, a work found only among the rarities of private libraries. Tom D., as he was usually called, lived to entertain queen Anne by singing his catches and glees; but being without any settled means of support, he concluded his career in poor circumstances. Addison, who was his friend, pleaded in his behalf—"He has made the world merry, and I hope they will make him easy, as long as he stays among us. This I will take upon me to say, they cannot do a kindness to a more diverting companion, or a more cheerful, honest, good-natured man." He died at an advanced age in 1723.

DUR'GA PU'JA. See UMA.

DURHAM, a co. in Ontario, dominion of Canada, on lake Ontario, intersected by the Grand Trunk and Midland railroads; 620 sq.m.; pop. '71, 37,381. Chief town, Port Hope.

DURHAM, a maritime co. of the n.e. of England, between the Tyne and Tees, bounded n. by Northumberland, e. by the German ocean, s. by Yorkshire, w. by Cumberland and Westmoreland. It is 48 m. long, by 39 broad, with 32 m. of coast, generally low, but with some cliffs; area, 973 sq.m., five sevenths being arable. The surface is hilly, and slopes to the east. In the w., which is waste but rich in minerals, are branches of the Pennine chain, rising in Kilhope law, 2,196 ft.; Colber law, 1678; and Pontop pike, 1018. The two chief branches inclose the valley of the Wear, and send forth several parallel ranges, declining toward the coast, and inclosing many fertile

tracts and sheltered valleys. The chief rivers are the Wear, Tyne, and Tees, navigable respectively for 12, 15, and 10 miles. The rocks are new red sandstone, magnesian limestone, millstone grit, carboniferous limestone, rich in lead; and coal-measures, forming the valuable D. coal-field, 25 by 10 m., with many faults, and with about 40 beds of coal, 3 to 10 ft. thick. Basalt and greenstone trap dikes intersect the w. part of Durham. The mineral products are coal, limestone, black marble, freestone, ironstone, firestone, slate, millstone, grindstone, and lead. Large furnaces for the production of iron are in operation in various parts of the county. D. is one of the chief counties in England for the production and export of coal: 500 ships, besides a fleet of steamers, are employed at Sunderland for this export alone. There are 240 collieries. Five of the coal-seams, at the depth of 20 to 100 fathoms, are worked horizontally for many miles: 212 miles of railway connect the mines and ports. The soil is a clayey or dry loam. The chief crops are oats, barley, wheat, turnips, beans, and pease. The Teeswater or Holderness breed of cattle is famed for fattening, quantity of milk, and early maturity. The D. horses are famed for draught and the saddle. Many sheep are pastured on the hills. There are manufactures of iron, pottery, glass, alkalies and chemicals, and salt, and much ship-building at Sunderland, South Shields, Jarrow, Hartlepool, and Stockton. Coal is the chief export. D. is divided into four wards, 15 poor-law unions, and 60 parishes, many of which have been subdivided, owing to the increase of population. In 1871, the pop. amounted to 685,089, being almost double of what it was in 1851. The chief towns are Durham, the co. town, Sunderland, Darlington, Gateshead, South Shields, Stockton, and Hartlepool. The co. sends four members to parliament. D. has some ancient barrows, and has afforded many Roman antiquities, as altars, urns, and coins. There are the remains of a fine Roman station at Lanchester. D. formed part of the Saxon kingdom of Northumbria (5-7 to 827). Subsequently, it suffered severely from the incursions of the Scots.

DURHAM COUNTY PALATINE, one of the three counties palatine of England, the other two being Lancaster and Chester. For the privileges of a co. palatine, see PALATINE. The co. palatine of D. existed by prescription. It was the only co. palatine in the hands of a subject, and belonged to the bishop of Durham. By 6 and 7 Will. IV. c. 19, the co. palatine of D. is separated from the bishopric, and vested in the crown.

DURHAM, a parliamentary and municipal borough, and ancient episcopal city of England, near the middle of Durham co., built around a steep rocky hill 86 ft. high, nearly encircled by the Wear. On the top of the hill are the cathedral and castle. Ancient walls partly inclose the hill, from which are fine views of the fertile wooded country around, and of the suburbs across the river. The chief manufactures of D. are carpets, paper, and iron. In the vicinity are coal-mines, and saline, chalybeate, and sulphureous springs. Pop. '71, 14,406. It sends two members to parliament. D. arose about the year 995, when bishop Aldune brought here St. Cuthbert's bones from Ripon, and built a church to enshrine them. On the site of this church, bishop William de Carilepho, about 1093, began the present magnificent cathedral, a Romanesque structure in the form of a Latin cross, to which additions continued to be made till about 1500. It thus exhibits the gradual changes of style between these periods. It was restored during last century, and has lately undergone extensive renovation. It is 507 by 200 ft., with a central tower 214 ft. high, and two west towers 138 ft. high. The cathedral contains many old monuments. Here lie St. Cuthbert's (q.v.) remains. Here also are Bede's tomb and some manuscripts said to be in his hand-writing. Cardinal Wolsey was a prelate here. The bishop's income is now £8,000. The castle, formerly the residence of the bishops of D., but now the seat of the university of D., was founded about 1072, by William the conqueror, in the Romanesque style, but it has since been much altered. The dormitory, now the new library of the cathedral, which belonged to the monastery of D., is one of the finest in England. Two of the bridges over the Wear were erected in the 12th century. D. was often attacked by the Scots.

A college was founded here in 1290 by the prior and convent of Durham. It was abolished, however, at the dissolution of monastic houses in the reign of Henry VIII., and its endowments given to the dean and chapter of Durham. Under the commonwealth, Cromwell instituted a college here, and endowed it with the sequestrated revenues of the dean and chapter, to whom, however, these revenues again reverted at the restoration, when the college was suppressed. The present university of D. was opened for students in 1833, under the provisions of an act of parliament, obtained by the dean and chapter during the previous year. A royal charter in 1837 empowered the university to bestow degrees. The D. university comprises professorships in divinity and ecclesiastical history, classical literature, mathematics and astronomy, and medicine, with lectureships in Hebrew, classical literature, etc. It has two colleges—University college, and bishop Hatfield's hall.

DURHAM, JOHN GEORGE LAMBTON, Earl of, an English statesman, was the son of William Henry Lambton, esq., of Lambton hall, county of Durham, and was born at the family seat, 12th April, 1792. The Lambton estate was not very large, but had been in the possession of the family since the 12th c., the male issue having never once failed during all that period. The antiquity of the family, however, exercised no narrowing influence on his opinions, which were markedly radical. He was educated at

Eton; and when only twenty years of age, married at Gretna Green a Miss Harriet Cholmondeley, who died in the course of a few years. In 1814, he was returned for his native county, and though he did not speak on many questions, he took part in all the more important debates, opposing the corn-law bill of 1815, the additions made to the incomes of the royal dukes, the indemnity bill of 1818, the six repressive bills brought in by government to coerce the people after the great reform meeting at Manchester in 1819, etc. Two years after, he submitted to the house of commons a scheme of parliamentary reform, which of course was not accepted. In 1828, he was raised to the peerage, with the title of Baron Durham of the city of Durham. He was one of the four persons who drew up the reform bill, and supported it in the house of lords. In 1833, lord D. was dispatched on a mission to Russia. On his return to this country, his "advanced liberalism" was proclaimed at a dinner given to lord Grey at Edinburgh, in 1834, and in various other parts of the country. After a second mission to Russia, he was appointed governor-general of Canada, where he arrived in May, 1839; but on account of a misunderstanding with the home government, he took the extraordinary step of returning to England in the course of half a year, without either being recalled or obtaining the royal consent. D. died at Cowes, Isle of Wight, 28th July, 1840. He left a son, the present earl of Durham, and three daughters.

DU'RIAN, or DURION, *Durio zibethinus*, a fruit-tree of the Malayan archipelago, of the natural order *sterculiaceæ*, of the same tribe or sub-order (*bombaceæ*) with the silk-cotton tree. It is a lofty tree, with leaves resembling those of the cherry, and large bunches of pale-yellow flowers. The fruit is of the size of a man's head, roundish oblong, with a hard thick rind, covered with soft spines, so that it somewhat resembles a hedgehog rolled up. The pulp of the fruit is of a sort of creamy substance and delicious taste, but has a smell which is at first very repulsive to Europeans. Persons accustomed to it, however, universally regard the D. as one of the very finest fruits of the east. It brings a higher price than any other fruit in the market in India. It contains 10 or 12 seeds, as large as pigeons' eggs, which, when roasted, are not inferior to chestnuts. One tree yields about 200 durians in a year.—The cultivation of the D. has not yet been successfully attempted in our hot-houses, the great size of the tree forming one principal obstacle to it. The D. is not a native of India, nor of Ceylon, but is now successfully cultivated in the latter country.

DÜRKHEIM, a t. of Rhenish Bavaria, on the Isenach, 20 m. n. from Landau. It stands at the entrance of the valley of the Isenach, at the base of hills which skirt the plain of the Rhine, and the neighborhood is very beautiful. Many invalids resort to D. on account of its amenity, and to take the *grape-cure*. It has manufactures of tobacco, cutlery, and paper. D. was formerly the residence of the princes of Leiningen-Hardenburg, whose palace was burned by the French in 1794. Not far off are the salt-works of Phillipshall. The summit of a neighboring height is crowned by a rampart of loose stones, 6 to 10 ft. high, 60 to 70 ft. wide at the base, and inclosing a space of about two sq.m., called the Heidenmauer (heathens' wall), which the Romans are said to have built to keep the barbarians in check, and where Attila is said to have passed a winter, after having wrested the fortress from the Romans, when pressing on his way to Rome. Pop. '75, 5,848.

DURLACH, an old t. of Germany, in the grand-duchy of Baden, is situated on the river Pfinz, at the base of the Thurmberg, a highly cultivated hill, 3 m. e. of Carlsruhe. D. manufactures linen, tobacco, chicory, vinegar, and machinery, and has extensive fruit and grain markets. The environs abound with orchards. On the summit of the Thurmberg are the ruins of an old castle. D. is a station on the Mannheim and Basel railway. Pop. '75, 6,782.

DUROC, GÉRARD CHRISTOPHE MICHEL, 1772–1813; Duke of Friuli; a French gen. who served in the wars of the revolution, in the army of Italy, and in the Egyptian campaign. He was a prominent actor in the overthrow of the directory, and was appointed lieut.-gen. and governor of the Tuileries. He went on diplomatic service to Sweden, Denmark, Russia, Prussia, and Saxony. In the battle of Austerlitz he was Oudinot's successor; and was near Napoleon in the subsequent campaigns. At the battle of Bautzen, while escorting Napoleon to a position that would overlook the field, Duroc was struck by a cannon-ball, and died soon afterwards. Napoleon afterwards bought the house where he died, and built on the spot a monument to his memory.

DURRA, DOURA, DURRA MILLET, INDIAN MILLET, or SORGHO GRASS, *Sorghum*, a genus of grasses, distinguished from *andropogon*—in which many botanists prefer to include it—only by the ovate or oblongo-ovate hermaphrodite spikelets, with glumes that have three small teeth at the extremity. The species are generally annual, tall, broad-leaved grasses, having strong culms filled with a juicy and saccharine pith, and large panicles. Several of them are cultivated as corn-plants chiefly in Asia and Africa, particularly the common D. (*S. vulgare*, or *andropogon sorghum*, *holcus sorghum* of the older botanists), also called *joar* and *jowaree* in India. It grows 4 to 8 ft. high, with thickly crowded panicles. It is a coarse, strong grass; its grain is round, a little larger than mustard seed. It is a native of the East Indies, is extensively cultivated in Asia, and may perhaps be described as the principal corn-plant of Africa. It is also cultivated to a considerable

extent in the s. of Europe. It is sometimes cultivated in Germany, but the summer is not sufficiently long and warm to secure its greatest perfection. The climate of Britain is still less suitable. D. yields a very abundant produce, in this respect even rivaling maize, but the meal does not make good bread; it is excellent, however, instead of rice for puddings, and is prepared in various ways for food. The culms and leaves, although coarse, are excellent food for horses and cattle, as is also the grain.—The seeds of the SHALOO or SUGAR-GRASS (*S. saccharatum*) are more pleasant to the taste than those of the common durra. It is cultivated in the warm parts of Asia and in Africa, and has a diffuse and very spreading panicle. The sweet pith of the culm is eaten, and is also of value as a source of sugar. This plant has been cultivated to some extent in the Veronese, and its cultivation has been recently introduced into North America—where it is called CHINESE SUGAR-CANE—in order to the production of sugar. It seems likely to form an important new feature in American agriculture, succeeding well at least as far n. as Maine, and yielding sugar in large quantity. In Britain, it succeeds only in the warmest parts. As a forage plant, it is very nutritious when young.—KAFFER CORN (*S. Caffrorum*) has a very diffuse umbel-like panicle, with branches bending down all around. The culm is more than the height of a man, and has a sweet pith. This species is largely cultivated in s. Africa, both by Kaffers and by the colonists. By the latter, the grain is chiefly used for feeding horses.—*S. halepense* is a troublesome weed in the fields of the n. of Italy, like couch-grass. The sweet runners of the roots are kept by the apothecaries of that country as a substitute for sarsaparilla, under the name of *garmignone*, or *smilace dolce*.

DÜRRENBERG, a small t. of Prussian Saxony, 5 m. s.e. of Merseburg, deserves mention only for its salt springs, which produce about 250,000 bushels of salt annually. Pop. '71, 202.

DÜRRENSTEIN, a village of lower Austria, is situated in a highly picturesque locality, on the left bank of the Danube, about 45 m. w.n.w. of Vienna. It is chiefly notable for the ruins of a castle, which stand upon a ridge of bare rock overlooking the town. A peculiar interest attaches to this grand but desolate and shattered fortress, from its having been the prison in which Richard Cœur-de-Lion was confined by Leopold of Austria, for 15 months. Pop. 650.

DURSLEY, a t. in the w. of Gloucestershire, amid picturesque scenery, at the base of a steep beech-covered hill, and near the Coteswold hills, 15 m. s.s.w. of Gloucester. It is irregularly built, and chiefly consists of three streets, diverging in different directions from the market-place. Pop. '71, 2,413. In the oolitic and lias formation in the vicinity is a quarry of tophies or puffstone, which is a soft and easily worked stone, but hardens on exposure to the air.

DURUY, VICTOR, historical writer, ex-professor, and ex-minister of public instruction in France, was b. at Paris in 1811. Members of his family were employed as designers in the lace-works at Gobelins, and he was, in his boyhood, intended to follow their occupation. He was, on this account, somewhat late in beginning his classical studies, which he did at the college Rollin, then called the college Sainte-Barbe; but the progress he made was rapid enough to enable him to enter the Ecole Normale in his 19th year. Here his career was sufficiently distinguished to obtain for him, in 1833, in succession, the position of teacher of history in the college of Rheims—which he only held for two months—and that of teacher or professor of history at Paris, in the college Henri Quatre, afterwards called the college Napoleon. This college (as well as the former) is a school of secondary instruction, in which history forms part of the programme of studies of the second (the next to the highest) class. The post which D. obtained in it was therefore by no means a high one. He continued to fill it till 1861. He had meanwhile gained a considerable reputation as a teacher of history, and as a writer on history and geography. Most of his books were school-books, but they were so good that they had a great influence upon the teaching of history in French schools. He got the degree of doctor of letters in 1853. In 1861 and the following year, he passed through a rapid course of promotion. He was first appointed an academy-inspector of the academy of Paris (an inspector of schools of secondary instruction in the district under the jurisdiction of that academy); next, master of conferences at the Ecole Normale; then inspector-general of secondary instruction; and, finally, professor of history in the Ecole Polytechnique. From the last-named post he was, on the 23d June, 1863, by imperial decree, advanced to the office of minister of public instruction.

D., who, by activity and ability combined, had made himself distinguished while filling a somewhat humble office, was no sooner charged with the control of public instruction, than he began to carry out important changes in the educational system of France—which had undergone scarcely any modification since the introduction of Guizot's education law in 1833. He instituted a tribunal for trying charges brought against professors. He remodeled the examinations for the degree of bachelor of letters. He first suspended, and afterwards abolished, the division of the highest class, which had prevailed in schools of secondary instruction, into two sections: the one rhetorical or literary, the other philosophical (scientific)—thus making the study of science obligatory upon all who passed through the school curriculum. He introduced other changes into the course of secondary instruction, of which the most important—at any rate, that

which has been most discussed—was the teaching of contemporary history in the lyceums, or departmental public schools. Previously, the text-books used in teaching history in these schools were Bossuet's *Histoire Universelle* and Montesquieu's *Grandeur et Décadence des Romains*—these works being supplemented by the lectures of the professor. D. had a text-book prepared for their use, containing a compendium of French history to so late a period as that of the recent French invasion of Mexico; and it has been alleged that this work, and the circulars which the minister published for the instruction of teachers of history, disclosed a systematic attempt to imbue the youth of France with a Bonapartist view of recent history—to make the teaching of the schools a source of future strength to the empire. Perhaps it would be difficult altogether to acquit D. of the Machiavellian design imputed to him. As to primary instruction, he officially proposed to the emperor to make it compulsory and gratuitous; but the proposal was badly received by the public, and the emperor withheld his sanction. He also procured legislative sanction for a measure which greatly increased the number of primary schools, especially of girls' schools, for which the provision made had previously been inadequate. The night-schools for adults, too, were greatly improved and extended under his care; and the educational libraries established in connection with them proved very effective aids to the education of the working-classes. He procured an enactment for establishing schools of special secondary instruction, intended mainly to teach the elements of science to boys of the lower middle class who are to be engaged in manufactures or commerce, and, in the country districts, to give systematic instruction in the methods of agriculture and horticulture.

The matters which have been mentioned are only a few of those which D., with bold and unsparing hand, leaving no part of the system of education untouched, dealt with while in office. It is unquestionable that he in many cases effected improvements; but the spirit and tendency of his administration were strongly impugned, and his conduct was jealously watched by the best portion of French society. It is alleged that he steadily attempted to secure the entire control of education for the state, and to use national schools as a state instrument. For example, the changes which he introduced in the examinations for the degree of bachelor of letters are said to have been intended to force candidates to study at the government establishments; and certainly, if their working has not been misrepresented, their tendency seems to be to place candidates educated elsewhere at a disadvantage. In such charges as this, there may be exaggeration or misconception; but D. is an ardent Bonapartist, and it is natural to suppose that he intended the results which his acts were calculated to produce. He resigned the office of minister of public instruction in 1869. He was decorated with the legion of honor in 1845, and was promoted to be officer, commander, and grand commander of that order. He has been an officer of the Turkish order of Medjidie since 1857.

Of D.'s numerous works, not a few were written for a series published under the title *L'Histoire Universelle*, of which D. was the editor. His earliest work, *Géographie Politique de la République Romaine et de l'Empire*, first appeared in 1838; it was followed by *Géographie Historique du Moyen Age* in 1839; *Géographie Historique de la France* in 1840; and *Atlas de Géographie Historique Universelle* in 1841. In 1840, he published the first volume of a work of greater pretensions than these—*Histoire des Romains et des Peuples soumis à leur Domination;* a second volume appeared in 1844; a third in 1853, under the title *L'Etat du Monde Romain vers la Fondation de l'Empire;* but the work appears to be still incomplete. *Histoire Sainte d'après la Bible* (1845), *Histoire Romaine* (1848), *Histoire de France* (1852), *Histoire Grecque* (1851), were among his subsequent productions. In 1862, appeared two volumes of his *Histoire de la Grèce Ancienne*, a work which has been crowned by the French academy. *Histoire Moderne* (1863), *Histoire Populaire de la France* (1863), *Histoire Populaire Contemporaine* (1864), *Introduction Générale à l'Histoire de France* (1865), were works prepared under his direction, and some of them partly consisting of extracts from his previous writings on French history.

DURYEA, JOSEPH TUTHILL, D.D., b. Long island, N. Y., 1832; a graduate of the college of New Jersey, where he was teacher of Greek and rhetoric; in 1859, graduated at Princeton theological seminary; pastor of a Presbyterian church, Troy, N. Y., 1859–62; in 1862–68, associate minister of the Collegiate Reformed church of New York; in 1868–79, pastor of Classon avenue Presbyterian church, Brooklyn; since 1879, pastor of the Central Congregational church, Boston. He is a broad and deep thinker, and his literary style is careful and finished, though his preaching is mostly without notes.

DUSICYON, a genus of *canidæ*, or sub-genus of *canis* (dog), consisting of a number of South American species or varieties, sometimes called aguara dogs. They have the body rather long in proportion to their height, and of considerable bulk, the muzzle rather sharp, eyes somewhat oblique, and aspect somewhat fox-like, the tail also has a more or less perfect fox-like brush. They are more diurnal than nocturnal in their habits, live in burrows, and feed on birds and small quadrupeds. Some of them have been domesticated by the Indians.—Akin to the aguara dogs, but more fox-like, are the aguara foxes (cerdocyon, q.v.).

DUSKY BAY, a large inlet on the s.w. coast of Middle isle, in New Zealand, is in lat. 45° 40′ s., and long. 166° 20′ east. It was entered by Cook in 1769, who here found good anchorage.

DÜSSELDORF, the chief t. of the district of Düsseldorf, in Rhenish Prussia, and the capital of the former duchy of Berg, is situated in the center of a fertile district, on the right bank of the Rhine, at the confluence of the Düssel with that river, in lat. 51° 13′ n., long. 6° 45′ east. It was formerly fortified, but its ramparts were converted into gardens and promenades at the treaty of Luneville, 1802. It is seated in the midst of extensive garden-grounds, and is well built. The streets, the houses of which are built of brick, are regular and spacious; while the rows of trees with which many of them are planted, greatly enhance their appearance. D. is divided into the *Altstadt*, on the right bank of the Düssel; the *Karlstadt*, founded in 1786 by the elector Karl Theodore, on the left bank; the *Neustadt*, on the Rhine; and the recently built *Friedrichstadt*, to the south. A colossal equestrian statue of the elector Johann Wilhelm, who founded a famous picture-gallery here in 1710—the pictures of which, however, were removed to Munich in 1805—stands in one of the five squares of Düsseldorf. The Düsseldorf academy was founded in 1767, reorganized in 1822, and attained great eminence during the years 1822-26, under the management of Cornelius and Schadow. The art-union for the Rhine provinces and Westphalia was founded here in 1828. The principal buildings of D. are the old electoral palace; the present palace, the residence of the governor of the province; the government house, the observatory, town-hall (built in 1567), theater, gymnasium, and public library. Of the ecclesiastical edifices, the most remarkable are the churches of St. Andrew and St. Lambert, and the church of the Jesuits, a handsome and highly ornate structure, having two steeples. The Hofgarten, one of the finest public gardens in Germany, is a very agreeable promenade. D. has manufactures of woolens, cottons, leather, hats, tobacco, jewelry, mirrors, railway carriages, etc., and its trade and industries generally are steadily progressing. A great part of its importance may be said to be derived from its position on the Rhine, as on this account great quantities of goods are sent to D. from the surrounding districts for exportation. Pop. '75, 80,695, most of whom are Catholics. Along with the duchy of Berg, D. came into the possession of Prussia in 1815. It was made a free port in 1829, and since that time it has prospered. It has daily communication with Mayence and Rotterdam by the Rhine steamers. Industry and commerce have likewise received a new impulse since D. became the central point of several lines of railway.

DÜSSELDORF SCHOOL OF PAINTING. This institution, founded in Düsseldorf by prince Charles Theodore in 1767, did not become famous until, in 1822, it was reorganized by king Frederick William, and put in charge of Cornelius, under whose direction it took at once a high rank. Cornelius was succeeded in 1826 by Schadow, and in 1859 by Bendeman. From 1864, the institution was managed by curators, till in 1873, Wiscelinus of Weimar was chosen director. The school has exerted a wide influence upon art, in America as well as in Europe. Several of the most famous American artists have studied there, and among those who have done much to introduce and popularize its methods and style in this country may be mentioned Eastman Johnson, George H. Hall, Leutze, and Bierstadt. The academy possesses 14,000 original drawings and sketches by the great masters, and 24,000 engravings. The German artists whose names have become most familiar in connection with the school are Cornelius, Lessing, Achenbach, Baur, Tidemann, and Knaus.

DUST-BRAND. See SMUT.

DUS'TEE, the largest river of Beloochistan, enters the Arabian sea, in lat. 25° 3′ n., and long. 61° 45′ east. In proportion to length, it is certainly the least considerable stream in existence. It is about 1000 m. long; and yet it has been found to be, at its mouth, 20 in. deep, and 20 yards wide. During its entire course, it is, in its permanent character, remarkably shallow; and, in fact, the watercourses of the country depend, without exception, almost exclusively on the rainy season.

DUS'TY-FOOT was a court of summary jurisdiction established at fairs in England for the speedy determination of questions arising between those who resorted to the fair. See PIEPOWDER COURT.

DUTCHESS, a co. in s.e. New York, on the e. side of the Hudson river, crossed by the Hudson river, the Harlem, the Dutchess and Columbia, and the Poughkeepsie and Eastern railroads; 810 sq.m.; pop. '75, 76,334; in '80, 79,273. It has a rolling and in some places hilly surface, and the soil is for the most part very fertile. Wappinger falls and Fishkill creek supply water-power. Limestone, slate, and marble are abundant, and lead and iron are found in some places. The productions are wheat, rye, corn, oats, buckwheat, potatoes, hay, garden vegetables, butter, fruit, etc. There are in the co. about 900 manufacturing establishments. Co. seat, Poughkeepsie.

DUTCH GOLD is an alloy of copper and zinc, in the proportion of 3 or 4 ozs. of zinc to 1 lb. of copper. It can be beaten out into thin leaves resembling gold-leaf, when it receives the name of *Dutch gold-leaf*, and almost rivals gold in appearance. It is very liable to be tarnished by gases, such as hydrosulphuric acid (sulphuretted hydrogen), which are constantly present in the air, especially in town districts, and it may be distinguished from true gold-leaf by the action of strong nitric acid, which instantly dissolves D. G., and leaves true gold unaffected.

DUTCH LANGUAGE AND LITERATURE (NETHERLANDS, *ante*). Dutch is the written dialect of the inhabitants of the Netherlands. It belongs to the Aryan family of languages and to the Teutonic division thereof. The alphabet consists of the same letters as the English, the vowels having essentially the same sound as in French. In the inflection of the nouns and in the general construction of words and sentences the language strongly resembles the German. The plural of the noun is usually formed by adding en or n to the singular. The language is characterized by great simplicity, directness, and force, the greater breadth of its inflections giving it some advantage over the English. It has great facilities for the formation of compound words, often a great convenience. In this respect it is superior even to the German. In many instances where the English are compelled in the formation of a technical word to borrow from the Latin or Greek, the Dutch resort to their own indigenous roots. Many nautical terms and phrases in common use among the English are derived from the Dutch. Some specimens of the Dutch language date as far back as the 9th century. They resemble low German, and show that the language had its origin in the same source as all the other Teutonic dialects. It is almost identical with the Flemish, the differences being mainly in orthography and pronunciation. Dutch literature, as distinguished from the Flemish, dates no further back than 1570. It has had, however, a very striking development. Among the distinguished scholars of the nation in the past may be mentioned Erasmus, Grotius, Arminius, Spinoza, and Boërhaave. In the earlier portion of the 17th c., the free commonwealth of Holland was distinguished above every other European nation for its devotion to literature, and it can hardly be said to have fallen much in the rear since that day. The nation has had and still has its eminent poets, historians, travelers, philosophers, scientists, and theologians, whose works have attained a high rank.

DUTCH LIQUID is an oily substance obtained by mixing chlorine and olefiant gases, which combine together and yield D. L., with the formula $C_4H_4Cl_2$. It has a specific gravity of 1280 (water=1000), boils at 184° F., is not miscible with water, but readily dissolves in ether and alcohol. It possesses the power of producing anæsthesia (q.v.), just as chloroform (q.v.) does; but the great difficulty of preparing D. L. in commercial quantities must retard its employment as an anæsthetic.

DUTCH REFORMED CHURCH. See REFORMED CHURCH IN AMERICA.

DUTCH RUSHES. See EQUISETUM.

DUTCH SCHOOL OF PAINTING. This school holds a high and honorable place in the history of art, being marked by many excellences and illustrated by many eminent names. The school took its rise in a divergence from the schools of Germany at the beginning of the 15th century. Its founders were Hubert and Jan van Eyck, who united the majestic simplicity of the ancient Christian type with a close imitation of external nature and a homely strength characteristic of their country. Hubert van Eyck improved the method of painting in oil to such an extent that he is almost entitled to the honor of being its inventor. The altar-piece in St. Bavo, at Ghent, is the work of the brothers van Eyck. In its complete form it consisted of a center picture of the Worship of the Lamb, surmounted by pictures of God the Father, the Virgin, and St. John, and flanked by folding shutters relating to the principal subject. The parts of this picture—one of the most remarkable productions of modern art—are now separated, the upper and middle portions remaining at Ghent, the others being at Berlin. Two of Hubert van Eyck's most important works are his "Triumph of the Church" in the museum at Madrid, and "St. Jerome" in the gallery at Naples. An admirable specimen of Jan van Eyck's work is a picture of a man and woman in the British national gallery. The influence of these brothers was very extensive. Their pupils were numerous, and of them all, Rogier van der Weyden, who died in 1464, was the most eminent. "The Last Judgment," in the hospital of Beaume, and the "Adoration of the Kings," at Munich, are his. Memling, one of his pupils, was remarkable for the refinement of feeling and the beauty of form displayed in his pictures. Some beautiful specimens of his work are in St. John's hospital, Bruges. "The Last Judgment" in the church of Our Lady, at Dantzic, is probably the best production of his pencil. His influence extended till nearly the end of the 16th century. Quentin Matsys was one of the earliest painters of those homely subjects of which so many examples are found in the Dutch school. His masterpiece, a "Deposition from the Cross," is in the Antwerp museum. Among the portrait painters of the Dutch school in the 16th c., several attained eminence in England. At the beginning of the 17th c. appeared the celebrated Rubens, the herald of a great revival of painting. His forms are gross, but full of life and power. His works are numerous, and specimens are to be found in almost every continental gallery. They may be studied to best advantage at Antwerp, Vienna, and Munich. His "Descent from the Cross," and its companion in the cathedral of Antwerp, are among his best productions. Vandyck, the celebrated portrait painter, was a pupil of Rubens. Some of his best work was done in England. The greatest of the Dutch painters, however, was Rembrandt, whose mastery of light and shade was wonderful, and whose works are now among the most precious treasures of art. His engravings are of equal merit with his paintings. The masters in *genre*, by which is meant the every-day life in art as contrasted with the grandeur of historical

or devotional works, have been numerous in the Netherlands. In this department, Teniers, the elder and the younger, are eminent. Gerard Dow, a pupil of Rembrandt, was also celebrated in this line. Among the most noted marine painters of the Dutch school were Bonaventura Peters and Ludolph Backhuysen. In the 18th c., there was in Flanders and Holland, as well as elsewhere, a decline in the artistic spirit, which was followed in the 19th by a revival.

DUTENS, Louis, a French writer, was b. at Tours, 16th Jan., 1730. Being a Protestant, he sought to make his way in England, and occupied himself at first in teaching and in self-improvement. At last, he accompanied the English ambassador to the court of Turin as his secretary, and afterwards remained as *chargé-d'affaires*, a position which he occupied twice subsequently. He held a pension, and was presented to the rich living of Elsdon, in Northumberland; and was likewise made historiographer-royal of Great Britain. He died in 1812. His numerous works display great versatility and knowledge of the world. He undertook the first comprehensive, though not complete, edition of Leibnitz's works (6 vols., Geneva, 1769). In his *Recherches sur l'Origine des Découvertes attribuées aux Modernes* (2 vols., 1766), he rates the knowledge and invention of the ancients by far too high. The *Tocsin* (Rome, 1769), which afterwards appeared under the title of *Appel au Bon Sens* (Lond. 1777), contains some sharp attacks on Voltaire and Rousseau. There is considerable historical interest in his *Histoire de ce qui s'est passé pour le Rétablissement d'une Régence en Angleterre* (Lond. 1789). He also wrote several able treatises on numismatics and other subjects. In the *Considérations Théologiques sur les Moyens de réunir toutes les Eglises Chrétiennes* (Par. 1798), he proposed that a council should compose a confession of faith grounded on the decrees of the councils of the first six centuries. His *Mémoires d'un Voyageur qui se repose* (Par. 1806) met with general favor.

DUTIES. See Customs.

DUTROCHET, René Joachim Henri, an eminent French physiologist and physician, was b. at the Château de Néon (Poitou), 14th Nov., 1776, and came to Paris in 1802, to study medicine. His career as a student was brilliant, and in 1808 he was appointed military physician to Joseph Bonaparte, king of Spain. Soon after, he became physician-in-chief of the hospital of Burgos, then devastated by typhus fever. Returning to France in 1809, he gave himself up exclusively to the study of nature, and published a series of works on physics and physiology, full of new ideas. In 1819, he became a correspondent of the royal academy of science; in 1823, of the royal academy of medicine; and in 1831, a member of the former. He died 4th Feb., 1847. The substance of all D.'s investigations and discoveries is contained in his *Mémoires pour servir à l'Histoire Anatomique et Physiologique des Végétaux et des Animaux* (Paris, 1837). He is best known by his researches on the passages of fluids through animal and vegetable substances. The passage of a fluid from without, inwards, he calls *endosmosis;* and from within, outwards, *exosmosis.* These terms have since been widely adopted by physiologists. See Diffusion of Liquids and Gases.

DUTTEEAH, the principality or raj of which the below-mentioned city is the capital, is a protected but not tributary state, extending in n. lat. from 25° 32′ to 26° 18′, and in e. long. from 78° 15′ to 78° 54′. It contains 850 sq.m., and 120,000 inhabitants. The revenue is fully £100,000; and the armed force numbers 6,000 men.

DUTTEEAH, a city of Bundelcund, in central India, lies between Agra and Saugor, being 125 m. to the s.e. of the former, and 148 to the n.w. of the latter. With a population of about 50,000, the place has many good houses, the residences of the principal zemindars or landholders of the neighborhood. Like most towns in Bundelcund (q.v.), D. has a rocky site; and it is surrounded by a stone wall 30 ft. high. The lat. and long. are 25° 40′ n., and 78° 31′ east.

DUTTON, Henry, ll.d., 1796–1869; b. Conn.; a graduate of Yale, and professor of law in that college. In 1854, he was elected governor of Connecticut; in 1861, he was judge of the superior court of errors. He compiled the statutes of the state, and prepared several digests.

DUTY. See Ethics.

DUUM'VIRS, officers among the Romans appointed for special services, such as magistrates of colonies and towns, constructors and commanders of fleets, and municipal censors. In the eastern empire the people elected for one year *duumviri ludorum,* who were to provide exhibitions of games at their own expense.

DUVAL', a co. in e. Florida, on the Atlantic, intersected by St. Johns river, and reached by the Jacksonville, Pensacola and Mobile and the Florida railroads; about 1000 sq.m.; pop. '70, 11,921—6,780 colored. The surface is level; chief productions, corn, sugar, and sweet potatoes. Co. seat, Jacksonville.

DUVAL', a co. in s.w. Texas, on the Rio Nueces; 1650 sq.m.; pop.'70, 1083. Stock-raising is the chief business. There is a railroad from Corpus Christi to the c. line of the county. Chief town, Concepcion.

DUVERGIER DE HAURANNE, Jean, 1581–1643; a French theologian, native of Bayonne; studied at Louvain, and was fellow-student with Jansen. About 1611, Duver-

gier was made canon at Bayonne. In 1620, he was made abbot of St. Cyran. In Paris he formed a connection with the influential Arnauld family, and, with Angelique Arnauld, directress of the convent of Port Royal, he completely reformed that institution. By taking a leading part in the Jansenist controversy, he excited the enmity of the Jesuits, and at last he was suspected by Richelieu, and thrown into prison in March, 1638. No evidence was found against him, but to break his strong influence he was kept confined until the death of Richelieu. He was then set free, and at once recommenced his war upon the Jesuits; but about six months afterwards died of apoplexy.

DUVERNOY, Georges Louis, 1777–1855; a French naturalist, invited in 1802 by Cuvier to assist in making the latter's treatise on comparative anatomy. Duvernoy prepared the last three volumes of the work. He practiced medicine for 20 years. In 1827, he was chosen professor of natural history at Strasburg, where he published several papers on anatomical themes. In 1837, he was professor of natural history in the college of France, and in 1850 occupied the chair of comparative anatomy.

DUVEYRIER, Henri, b. Paris, 1840. He was educated in Germany, and became acquainted with Dr. Barth, the African explorer. He made a trip to Africa in 1857–59, and published *Explorations of the Sahara.* In 1871, he served in the French army, and was for a time a prisoner of war.

DUXBURY, a t. in Plymouth co., Mass., on the n. shore of Plymouth harbor, reached by a branch of the South Shore railroad; 38 m. from Boston; pop. '70, 2,341. It is the landing place of the Atlantic cable from Brest, France. Fishing and ship-building are the leading industries.

DUYCKINCK, Evert Augustus, 1816–78; b. N. Y.; graduated at Columbia college, 1835; in 1840, editor of *Arcturus,* a monthly magazine; in 1847, he and his brother George started the *Literary World,* and continued it till 1853. In 1856, the brothers finished the *Cyclopædia of American Literature,* an elaborate work in two large volumes, to which, in 1865, Evert added a supplement. Among his publications are *Wit and Wisdom of Sydney Smith; Poems relating to the American Revolution; History of the War for the Union; National Portrait Gallery of Eminent Americans; History of the World from the Earliest Period to the Present Time;* and *Memoirs of Francis L. Hawks.*

DUYCKINCK, George Long, 1823–63; b. N. Y.; brother of Evert A.; graduate of the university of New York, 1843. Besides his work with his brother, he was the author of *George Herbert of Bemerton,* and of lives of bishop Thomas Ken, Jeremy Taylor, and Latimer.

DUYSE, Prudens van, a Belgian writer, was b. in Dendermonde, in Belgium, Sept. 28, 1804. After completing his academical career, he was appointed archivist of his native town, from which he was removed to the same office in Ghent. He soon afterwards received the office of professor of national history in the athenæum, and was made a member of various learned societies both in Belgium and France. He died Nov. 13, 1859. D. was one of the chief contributors to the revival of Flemish literature. As a poet, he was less remarkable for genius than for prodigious fertility; his pieces all bear the stamp of improvisation, of which he was a great master. Several of his productions, both poetical and prose, obtained prizes from literary societies. Of 47 poetical publications issued by D. between 1836 and 1859, we may mention *Vaderlandsche Poëzy; Natalia; Elegiën; Gedichtjes voor Kinderen; Het Klaverblad;* and *Nieuwe Kindergedichtjes.*

DWALE. See Belladonna.

DWARF. See Giants and Dwarfs.

DWARFED TREES, growing in flower-pots, are a characteristic ornament of Chinese and Japanese houses and gardens, and the production of them is an art which has been carried to great perfection. It depends on the prevention of an abundant flow of sap, so that whilst the tree is kept living and healthful, vegetation does not go on with its natural activity. The trees are planted in shallow and narrow flower-pots; care is taken that their roots never pass into the ground beneath; they are very sparingly supplied with water; their strongest and leading shoots are pinched off, and their branches are bent and twisted in various ways. A very extraordinary dwarfing is the result of these and other such processes; and the dwarfed trees not unfrequently abound in flowers and fruit.

DWARKA, a maritime t. of the province of Guzerat, in India, stands on the w. side of the peninsula of Kattywar, being in lat. 22° 15′ n., and long. 69° 1′ east. It is one of the most sacred places in this part of Hindustan. On an eminence overhanging the sea-shore, which was once an islet, stands a great temple of Krishna, presenting to the mariner a conspicuous landmark; while, connected therewith by a colonnade, is a smaller edifice dedicated to Deoki, the mother of Krishna. The Gumti, a bordering rivulet which barely reaches the ankle, is, notwithstanding its insignificance, an object of profound veneration.

DWIGHT, Edmund, 1780–1849; b. Mass.; graduated at Yale, and studied law. He was the founder of a firm in Boston which, by establishing great cotton mills, did much toward building up the manufacturing villages of Holyoke and Chicopee. He was

also a leading promoter of normal schools in the state, to the establishment of which he gave a large sum of money.

DWIGHT, HARRISON GRAY OTIS, D.D., 1803–62; b. Mass.; graduated at Hamilton college in 1825; and at once went out under the direction of the American board to assist in the Armenian mission in Turkey, taking a position in Constantinople, where he soon became noted as one of the most zealous and successful workers in the Armenian field. While on a visit to the United States he was killed in an accident on the Troy and Bennington railroad. Among his works are *Researches of Smith and Dwight in Armenia; Memoirs of Mrs. Elizabeth B. Dwight; Christianity Revived in the East;* and a *Catalogue of Literature in Armenia.*

DWIGHT, JOHN SULLIVAN, b. Boston, 1813; graduated at Harvard, and became a Unitarian minister, in which office he continued about six years. He was one of the Brook Farm experimenters, holding on to the last. Having an excellent musical education, he was engaged by the New York *Tribune* to write a series of criticisms of Jenny Lind's performances, which were the first musical criticisms of any consequence that ever appeared in an American daily journal. Soon after the departure of the songstress he established (in 1852) in Boston *Dwight's Journal of Music*, of which he is still the editor.

DWIGHT, NATHANIEL, 1770–1831; a brother of Timothy of Yale. He issued the first geography for common schools published in the United States. Among other works by him are *A Compendious History of the Signers of the Declaration of Independence,* and *The Great Question Answered.*

DWIGHT, SERENO EDWARDS, D.D., 1786–1850; a graduate of Yale; at first a lawyer. In 1817, after studying divinity, he became pastor of Park street church, Boston. From 1833 to 1836, he was president of Hamilton college. Among his works are *Life of Jonathan Edwards* (his great-grandfather, whose works he edited), and *The Hebrew Wife.*

DWIGHT, THEODORE, 1764–1846; b. Northampton, Mass.; a lawyer and journalist. His mother was a daughter of Jonathan Edwards. In politics, he was an extreme federalist, and officiated as secretary in the Hartford convention. He was a brilliant writer and speaker, and was in congress, 1806–7. He edited the *Mirror*, Hartford, Conn.; then the *Albany Daily Advertiser;* and started the New York *Daily Advertiser* in 1817, and was its principal editor for eighteen years. His works were *Life and Character of Thomas Jefferson,* and *History of the Hartford Convention.*

DWIGHT, THEODORE, 1796–1866; son of the secretary of the Hartford convention; graduated at Yale, 1814; and turned his attention to authorship. Among his works are *Tour in Italy; Life of Garibaldi; School Dictionary of Roots and Derivatives; Northern Traveler; Tour in New England; Father's Book; First Lessons in Modern Greek; The Roman Republic of* 1849; and *The Kansas War.*

DWIGHT, THEODORE WILLIAM, LL.D., b. N. Y., 1822; graduated at Hamilton college; afterwards studied law, and was professor of that science in Hamilton college, where he started a school of law. In 1858, he became professor of law in Columbia college, New York. He has published several works on legal themes, among which are *Trial by Impeachment; Argument in the Rose Will and Charity Cases;* besides papers in the *American Law Register*, of which he was assistant editor. In 1868, he became non-resident professor of constitutional law in Cornell university, and, in 1869, lecturer in Amherst college. He has been member of the N. Y. state constitutional convention in 1867; president of the N. Y. prison association; and was one of the committee of seventy chosen by the people, without regard to parties, to bring about reforms and economy in the local government of New York city.

DWIGHT, DR. TIMOTHY, a well-known American theologian, was b. at Northampton, in Massachusetts, May 14, 1752; studied at Yale college, New Haven; and was licensed to preach in 1777. During the war of independence, he was for some time a chaplain in the American army. In 1783, he was ordained minister of Greenfield, in Connecticut, where he also conducted an academy for 12 years with distinguished success. In 1787, the college of Princeton, N. J., conferred on him the degree of D.D.; and in 1795, he was elected president of Yale college and professor of divinity. He died Jan. 11, 1817. D.'s principal work is his *Theology Explained and Defended in a Series of* 173 *Sermons* (5 vols., Middletown, Conn., 1818, etc.). It has been frequently reprinted in England; and used to be—as probably it still is in quiet country quarters—very popular among elderly persons of a serious turn of mind. D. was not a great or original thinker; but his mind was fertile in the production of respectable ideas, which, though sufficiently commonplace, were yet pleasing both in themselves, and from the important nature of the subjects to which they referred. Among his other writings may be mentioned, *The Conquest of Canaan, an Epic Poem* (1785); *Travels in New England and New York* (1821), reckoned by Southey the most important of his writings; and two volumes of *Sermons* (Edin. 1828).

DWIGHT, WILLIAM THEODORE, D.D., 1795–1865; b. Conn.; graduated at Yale, 1813; admitted to the Philadelphia bar, 1821. About 1830, he turned his attention to

theology, studied for the Congregational ministry, and (two years afterwards) became pastor of the Third church, Portland, Me. He published a memoir of his brother, Sereno Edwards Dwight, and a number of reviews and addresses. He was a man of commanding influence as a thinker, writer, and preacher.

DWI'NA, NORTHERN—as distinguished from the Western Dwina or Düna (q.v.)—an important river of Russia, has its origin in the confluence of the Suchona and the Jug, two streams, the latter more than 200 m., and the former nearly 300 m. in length, rising in the s. of the province of Vologda, and uniting in lat. 60° 45′ n., long. 46° 30′ east. The D., from the union of these streams, flows n. for about 50 m., and receives the Vytchegda from the e., a river 500 m. long. At this point, the D. becomes navigable, and here it alters its direction, and proceeds n.w. toward the gulf of Archangel, into which it flows, having been joined on the right by the Pinega, and on the left by the Waga, and having traversed a course of about 700 miles. The basin of the D. comprehends an area of 123,900 sq. miles. Its average width is from 500 to 600 ft.; before debouching into the White sea, however, its surface, which is there marked by many islands, increases in width to about 4 miles. The waters of the D., the largest river that falls into the White sea, are abundantly supplied with fish. Vessels of more than 14 ft. draught cannot enter the D., on account of the shoals at its mouth.

DYAKS. See BORNEO, *ante.*

DYCE, ALEXANDER, an English literary historian, was b. at Edinburgh, 30th June, 1798. He was educated at the high school of that city, and afterwards at Oxford. After officiating for some time as curate, he settled in London in 1827. His literary reputation is chiefly based on his editions of the older English poets and authors—George Peele, Robert Greene, John Webster, Shirley, Thomas Middleton, John Skelton (an author of the beginning of the 16th c., previously little known), Beaumont and Fletcher, Ford, and Marlow, with biographies of the authors, and instructive notices. He also edited the poems of Shakespeare, Pope, Akenside, and Beattie, for Pickering's Aldine Edition of the Poets. An old play discovered by him, called *Timon,* and which may possibly have first suggested to the great poet the idea of his drama of the same name, was besides published for the Shakespeare society, as well as another entitled *Sir Thomas More.* In conjunction with Collier, Halliwell, and Wright, he founded the Percy society for the publication of old English ballads, plays, and poems. His ability as a commentator on Shakespeare is proved by his *Complete Edition of the Works of Shakespeare; the Text Revised; with Account of the Life, Plays, and Editions of Shakespeare, Notes, etc.* (1858). He died in 1869.

DYCE, WILLIAM, R.A., a distinguished painter, was b. at Aberdeen in 1806. He was educated at the university there, and at the age of 16 took the degree of master of arts. After acquiring the rudiments of his art-education he went to Rome, where he studied for some years. His tendency at first was very strongly, and continued so under certain modifications, towards early Italian, or pre-Raphaelite art, and his productions attracted the marked attention of Overbeck, the head of the modern German school. On his return to this country, he settled in Edinburgh, where, besides painting portraits, he contributed largely to the exhibitions. The first picture he exhibited in Edinburgh was in the Perugino style, and though evincing great power, was at that period, 1829, but little felt or appreciated; his "Puck," however, exhibited at the same time, was very successful, and most of his after-contributions to the exhibitions of the royal Scottish academy, of which he was a member, were deservedly popular, particularly his picture of "Francesca da Rimini," exhibited in 1837. After this he went to London, having been nominated to the head-mastership of the new school of design at Somerset house, an office which he obtained on account of his general acquirements and knowledge of art, and which he held for three years. Soon after this he was appointed professor of painting in the London university. He distinguished himself at the Westminster competition by his frescos, and in consequence was one of the artists selected to decorate the palace of Westminster and the house of lords, and at Osborne house several works in fresco have been executed by him. D. was elected an associate of the royal academy in 1844, and academician in 1848. The following are some of the works he exhibited in the royal academy: "King Joash Shooting the Arrow of Deliverance;" a "Madonna and Child" (1846); a "Meeting of Jacob and Rachel" (1850; "Christabel" (1855); "The Good Shepherd" (1856); "Titian Preparing to make his Essay in Coloring;" "Neptune Assigning to Britannia the Empire of the Sea;" a study for a fresco at Osborne (1857); "St. John Leading Home his Adopted Mother;" "The Man of Sorrows" (1860); and "George Herbert at Bemerton" (1861). He died in 1864.

DYCK, Sir ANTHONY VAN. The history of this celebrated painter is of great interest, not only from the high position he held as an artist, but from his having settled in England, where he executed numerous works, which enable us to realize most of the personages whose actions form prominent points in the history of this country. He was b. at Antwerp, 22d Mar., 1599. His father, according to Houbraken, was a glass-painter; and it is said that his talent was fostered by his mother, who painted landscapes, and was skillful in embroidery. After making very considerable progress under Van Balen, he was, in 1615, admitted as a pupil of Rubens, who was not slow to

appreciate his great talents. In a letter, dated 17th July, 1620, addressed to the earl of Arundel, known historically for his patronage of art, the writer states, "Van Dyck lives with Rubens, and his works are beginning to be esteemed little less than those of his master. He is a young man of one-and-twenty, whose parents are persons of considerable property, and it will be difficult, therefore, to induce him to remove." Soon after this—namely, in 1621—by advice of Rubens, he visited Italy. The works of the great Venetians were the first to attract his attention. After leaving Venice, Genoa was the next city he resided in, then Rome, and he went a second time to Genoa, from whence he made a short visit to Palermo. Van Dyck was five years in Italy, and from the number of portraits painted by him in Genoa—many of the best of his works in his Italian manner are still there—he must have lived a considerable portion of the time in that city. On his return to Antwerp, in 1626, he executed various pictures for churches, and the portraits classed among those painted in his Flemish style; the series of cabinet portraits of the painters of his day, engraved by Vostermans, etc., and most of which are now in the possession of the duke of Buccleuch, were also painted at this time. It is stated that, about 1630–31, Van Dyck visited England, and, meeting with no encouragement, remained only a short time; however, there is no satisfactory proof of this. But in 1632, he came to England, by invitation of the earl of Arundel, at the command of Charles I. He was lodged at Blackfriars, was soon afterwards knighted, and had a pension of £200 a year settled on him. His commissions were now numerous, he was enabled to live in great style, entertained people of high rank, and had a country-house at Eltham, in Kent. His wife, Marie Ruthven, by whom he had one daughter, was the daughter of Patrick Ruthven, physician, fifth son of lord Gowrie. Van Dyck died in London in 1641, leaving property to the amount, it is said, of about £20,000. Only 20 years are included within the time when Van Dyck left the studio of Rubens till the period of his death; and during that short career, the number of pictures executed by him, on what is thought to be good authority, seems almost incredible, for in Smith's Catalogue Raisonné of the Works of the Dutch and Flemish Painters, there are descriptions and interesting particulars of upwards of 950. This artist's works may be classed as executed in three distinctly marked styles: 1. Those painted in Italy during his residence of five years, from 1621 till 1626; these are distinguished by deep tone and color, and dignity of character and expression. The portraits of the "Lomellini Family" and an "Italian Nobleman," in the Scottish national gallery, are good examples of his style at this period. 2. His productions between 1626 and 1631, when he lived in Flanders, are known as done in his Flemish style; these works are executed with much *impasto* or body of color in the lights, and transparency in the shadows. Perhaps it was during this period of his career that he executed his finest works, among which the best are the portrait of Snyders the painter, now the property of the earl of Carlisle; the companion-picture of Snyder's wife, now belonging to the earl of Warwick; and the portraits of Philip le Roy and of his wife Mme. le Roy, purchased by the marquis of Hertford at the sale of the king of Holland's pictures. 3. The portraits he painted in England between 1631 and 1641; these are noted for grace and elegance, but many of them were often slight in execution, or done partly by assistants. Van Dyck's biographers and critics generally dwell at great length on his Scripture subjects, and express regret that he devoted so much of his time to portrait-painting; but different notions seem to be now gaining ground. No Scripture subjects by Rubens or Van Dyck, or produced in any of the later schools, will stand comparison, for purity of feeling and appropriate technical execution, with the works of the earlier masters; and the allegorical pieces so much in vogue in the 17th c., are little in accordance with the ideas of the present time. But the portraits by Van Dyck are all interesting and valuable histories, recorded with marvelous truth and vividness, of characters who played important parts in an era noted for great events—and as works of art will rank with the productions of the best schools.

Van Dyck's etchings are admirable. Several of the portraits in the collection of portraits of artists, are etched by him. The impressions of those that were thrown off, when the heads merely were etched, are of great value; indeed, in expression and spirit, they are unequaled. See Carpenter's *Memoir* (1844).

DYEING is the art of staining or coloring yarn or cloth. It has been practiced among eastern nations from time immemorial; and in the sacred writings, we read of the vestments of the high-priest being dyed purple, of linen cloths being dyed blue, purple, and scarlet, and of rams' skins being dyed red. The famous Tyrian purple is believed to have been discovered by an inhabitant of Tyre fifteen hundred years B.C.; and immediately afterwards the Tyrian purple became the badge of royalty, and cloth dyed with it commanded a princely price. The Egyptians, Greeks, and Romans practiced the art of dyeing; and gradually it became more and more wide-spread as civilization advanced, the discovery of America and other lands materially increasing the number of dye-stuffs. In earlier times, dyeing was much more extensively followed as a domestic art than it is at the present time. In the Highlands of Scotland, however, females are still in the habit of dyeing cloth *brown* by immersing it in a solution of copperas (sulphate of iron), and then treating it with a decoction of sumach, logwood, and crottel (*parmelia omphalodes*), a lichen which covers many rocks and trees in moist situations; *black*, by immers-

ing the cloth or yarn in an infusion of the bark of the alder-tree (*alnus glutinosa*), along with copperas and a little sumach; *yellow*, by the common heather (*calluna vulgaris*) and alum; *red*, by the roots of bed-straw (*galium verum*) and alum, etc.

The dye-stuffs (q.v.) employed in the various processes of dyeing are numerous, and when two or more are associated together, many different shades and colors are produced besides the original color yielded by each. The dyeing materials are procured from the mineral, vegetable, and animal kingdoms, and are often very costly. The arrangements connected with dyeing operations are at times simple, whilst at other times they are complex, and require the greatest care and skill on the part of the dyer. In communicating the deep indigo blue to woolen cloth and yarn, a vat is taken, about 6 or 7 ft. in diameter, and 8 to 9 ft. in depth, and nearly filled with water, along with 18 to 22 lbs. of indigo, 10 to 20 lbs. of madder, 7 to 9 lbs. of bran, and generally 7 to 9 lbs. of woad. After the requisite boiling, and the addition of 7 or 8 lbs. of lime, to form an alkaline liquid in which the indigo can be held in solution, the whole is well closed over with tightly fitting wooden covers; and in a day, the putrid fermentation of the woad and bran proceeds, the result of which is to abstract the oxygen from the blue indigo, the color of which is gradually reduced till it assumes a yellowish color, and the solution then contains indigo white. If woolen yarn or cloth is now dipped in this liquid, it comes out of a yellow tint, from the attachment of the white indigo solution; but when exposed to the air, the oxygen immediately begins to act upon the white indigo, combining with it, so as to form oxidized or blue indigo, and as the process of oxidation proceeds, the yarn or cloth becomes first of a greenish and then of a blue color. If the cloth be again soaked in the yellowish solution, and subsequently exposed to the air, the depth of the blue color may be increased step by step, till it arrives at that deep shade of blue so well known, especially in the coarser qualities of woolen cloth. In the dyeing of cotton with indigo, the vat is prepared differently. The indigo is first ground into a thin paste with water, and afterwards placed in a vat with protosulphate of iron and milk of lime. The lime (CaO) takes the sulphuric acid (SO_3) from the sulphate of iron ($FeOSO_3$), forming sulphate of lime ($CaOSO_3$), and liberating protoxide of iron (FeO), which immediately abstracts the oxygen from the blue indigo, reducing it to white indigo, and the latter dissolves in the excess of lime present in the vat, yielding a colorless solution. When cotton cloth or yarn is dipped in this, it comes out of the vat almost colorless; but on exposure to the air, the indigo becomes reoxidized, and the cloth passes to a green, and ultimately to a deep-blue shade. The cloth or yarn is then washed in water, and afterwards soaked in very dilute sulphuric acid, to which remove any oxide of iron remaining attached, and rewashed in water, when the blue color becomes more bright and clear.

In the fixation of color upon cloth, recourse is often had to a mordant (see CALICO-PRINTING), which acts as a middle agent, and attaches the color to the cloth. The principal mordants are alum, cream of tartar, and salts of tin. Previous to the application of any color, the cloth or yarn must be well cleansed from grease, oil, etc., by scouring in soda or in soap, and except where the material is to be dyed of a dark color, the goods are also subjected to the process of bleaching. In the case of fabrics which require a smooth surface, the preliminary operation of singeing off the loose hairs is resorted to (see CALICO-PRINTING).

DYEING OF COTTON.—The following receipts for the dyeing of cotton apply to 10 lbs. weight of cotton yarn or cloth, which is found to be the smallest quantity capable of being well-dyed at one time. The proportions of each ingredient may be altered, however, so as to correspond with the quantity of cloth or yarn to be operated upon.

1. *Common Black.*—Take 3 lbs. sumach, and treat with hot water; steep the goods in the hot decoction for some hours; wring out; wash for 10 minutes in lime-water, and for 30 minutes in a solution of 2 lbs. copperas. Wash the goods well in cold water, sometimes repeating the treatment with lime, and rewashing; then work the goods for 30 minutes in a warm solution of 3 lbs. of logwood, and afterwards with 2 ozs. copperas; work again for 10 minutes; wash and dry.

2. *Jet Black.*—Proceed as at 1, adding 1 lb. of fustic with the logwood; and when 3 pints of iron liquor are used instead of the 2 ozs. of copperas, a more brilliant black is obtained.

3. *Blue Black.*—Use the indigo blue vat, and then proceed as at 1.

4. *Brown.*—Treat the goods with a yellow dye; then work for 30 minutes in a decoction of 2 lbs. lima wood and 8 ozs. logwood; lift and work with 2 ozs. alum for 15 minutes; then wash and dry.

5. *Catechu Brown.*—Immerse the goods at a boiling temperature in a decoction of catechu; then work for 30 minutes in a hot solution of 6 ozs. bichromate of potash. Wash in hot water, and if the latter contain a little soap, the color will be improved.

6. *Chocolate or French Brown.*—Dye the goods with a spirit yellow; then treat for half an hour with a solution of 3 lbs. of logwood; raise with a little red liquor; work for 10 minutes; wash, and dry.

7. *Red.*—Make a hot solution of 3 lbs. of sumach; introduce the goods, and let stand till the liquor is cold; then wring out, and work in water containing in each gallon a gill of red spirits (prepared by adding 2 oz. of feathered tin by degrees to a mixture of three parts of hydrochloride acid, one part of nitric acid, and one of water in

the cold) for 30 minutes; wring and wash well; then work the goods for 30 minutes in a lukewarm decoction of 3 lbs. of lima-wood and 1 lb. of fustic; add a gill of red spirits; work the goods longer; wash, and dry. The famous Turkey-red is imparted to the cloth by first impregnating it with an oily or fatty substance, and then subjecting it to a decoction of madder. It is one of the most durable of all colors.

8. *Yellow or Straw.*—Work the goods in a weak solution of acetate of lead; then wring out, and work in a dilute solution of bichromate of potash; wring out, and work again in the lead solution; wash, and dry.

9. *Leghorn Yellow.*—Proceed as at 8, but add a little annotto liquor with the solution of bichromate of potash

10. *Spirit Yellow.*—Work the goods through a weak solution of protochloride of tin for 30 minutes; then work in a solution of quercitron bark for 15 minutes; lift out, and work again in tin solution, and wash in cold water.

11. *Orange.*—Proceed as at 8, and afterwards pass through lime-water at the boiling point, ultimately washing in cold water.

12. *Blue.*—The goods are worked in various strengths of solutions of salts of iron, such as nitrate of iron; wring out; wash in water, and then work in solution of yellow prussiate of potash; wring out, and wash in water containing a little alum. The various shades of blue may be obtained by using stronger or weaker solutions.

13. *Green.*—Dye the cloth blue; then work in red liquor (acetate of alumina); wash in water; work in decoction of fustic or bark; raise with solution of alum; wash in cold water, and dry. The darker shades of green, as olive or bottle green, are brought out by the use of sumach and logwood along with the fustic.

14. *Puce or Lilac.*—Work the cloth or yarn in red spirits (see 7), then in logwood solution at a temperature of 140° F., adding a little red spirits, red liquor, or alum; wash, and dry; or dye the cloth blue (12); then work in solution of logwood; add alum; work again; wash, and dry.

15. *Purple.*—Soak the goods in a warm decoction of sumach till cold; work for an hour in red spirits; wash; work in hot solution of logwood; then add a little red spirits, and work again; wash, and dry. The various shades of purple may be obtained by altering the strength of the chemicals; the more sumach, the browner the hue, and the more logwood, the bluer the purple becomes.

16. *Lavender or Peach.*—Work the goods for 20 minutes in spirit-plumb (a strong solution of logwood, treated with about one sixth of its volume of a solution of tin, made by dissolving tin in six or seven parts of hydrochloric acid, one part of nitric acid, and one of water); wring out, and wash well in cold water.

17. *Safflower Lavender* is obtained by dyeing the goods a light-blue, then working in decoction of safflower, which places a pink on the top of the blue.

18. *Drab.*—Work the goods in a decoction of sumac; lift, add copperas; rework; wash in water; then work in a mixed decoction of fustic, lima wood, and logwood; raise with a little alum; wash, and dry. Catechu is occasionally employed.

Dyeing of Wool.—In the dyeing of woolen yarn and cloth, the various steeps are used warm, but the washings in water are done cold. Care must be taken to remove every particle of grease from the wool by washing with soda and soap, before it is subjected to the process of dyeing, else the coloring matters will not adhere. The more common and important colors are obtained as follows:

19. *Black*—by working the cloth in a bath of camwood, then of copperas; after which wash out; then treat with decoction of logwood and copperas: or work in a bath of bichromate of potash, alum, and fustic; lift, and expose to the air; then immerse in decoction of logwood, barwood, and fustic; thereafter of copperas.

20. *Brown.*—The goods are worked in a bath of fustic, madder, peachwood, and logwood; then introduce into dilute solution of copperas: or the goods are treated with a bath of bichromate of potash, argol, and alum, washed, and then introduced into a bath of fustic, madder, peachwood, and logwood.

21. *Red*—by working in a decoction of bichromate of potash and alum, and subsequently in a bath of peach or lima wood, with a little alum. Scarlet is obtained from cream of tartar, cochineal, sumach, and fustic.

22. *Crimson*—from cochineal, cream of tartar, and chloride of tin. Cudbear gives a wine tint.

23. *Pink.*—Work the goods in a bath of tartar, alum, cochineal, and red spirits.

24. *Orange*—from a bath of sumach, cochineal, fustic, tartar, and red spirits.

25. *Yellow*—from a bath of tartar and alum; then a decoction of bark, sumach, fustic, and red spirits.

26. *Blue.*—Various shades may be obtained from immersion in salts of iron, and then in solutions of yellow prussiate of potash (see 12). Also work the wool in a bath of argol, alum, and indigo extract.

27. *Green.*—Work the goods in a bath of fustic, argol, and alum, and thereafter in a solution of indigo. The dark shades of green, such as olive, are brought out by a bath of fustic, logwood, madder, and peachwood, and afterwards of copperas.

28. *Violet*—from cudbear, logwood, barwood, or camwood, and peachwood; as also alum. The addition of copperas brings out a puce tint.

29. *Drab.*—The manifold shades of this color are procured from variable strengths

of decoctions of madder, peachwood, logwood, fustic, associated with alum and copperas.

DYEING OF SILKS.—The operations connected with the dyeing of silk are similar to those already sketched out, but a more thorough scouring of the raw material requires to be made, so as to remove all the gum and wax belonging naturally to the fiber.

30. *Black* is obtained by working the silken material in copperas (sulphate of iron), then in logwood containing some chamber liquid, and repeating the treatment with copperas and logwood till the requisite shade is procured. A little nitrate of iron tends to give a more full, deep black; and alum and white soap are also used with advantage. Acetate of copper is occasionally used.

31. *Blue-Black.*—Dye a blue as at 12, and then proceed as at 30.

32. *Brown.*—Obtain an orange by immersion in a solution of annotto, then treat with copperas; and introduce into a bath of fustic, logwood, archil, and a little alum. If a more yellow tint is required, add more fustic; redness is obtained by adding peachwood, and blueness by the addition of logwood.

33. *Reds* are obtained from peachwood and fustic, and thereafter red spirits. Annotto is used in getting up the scarlet shades, and cochineal and safflower in the more expensive red dyes. Rubies and maroons require cudbear.

34. *Pink*—from safflower, associated with sulphuric acid and cream of tartar.

35. *Orange and Yellow*—by treating the goods with more or less strong solutions of annotto, associated with alum and white soap.

36. *Blue*—from salts of iron and yellow prussiate of potash; or from solutions of sulphate of indigo, assisted with a little alum.

37. *Green*—from steeping in decoctions of fustic and sulphate of indigo, along with a little alum. The darker shades have copperas added and logwood.

38. *French and Pearl White.*—Work the silk in a lather of white soap, to which archil or cudbear has been added, to give the required shade.

39. *Drab*—from decoctions of sumach, fustic, logwood, and more or less copperas, according to the depth of shade required.

DYEING OF MIXED FABRICS.—The coloration of textile fabrics composed of more than one kind of material, generally requires two or more processes, as the plan pursued in dyeing wool is seldom capable of fixing the color upon cotton. The customary plan followed is to immerse the fabric in the requisite baths, to dye the wool, and then to treat the partially dyed material in the manner found suitable for cotton. Occasionally, the woolen thread of the cloth is dyed of one color, and thereafter the cotton is treated so as to acquire a different shade or color. The producing of a colored pattern on cloth has already been considered under CALICO-PRINTING.

DYER, a co. in w. Tennessee, on the Mississippi; 606 sq.m.; pop. '70, 13,706. Soil rich, surface level, with extensive forests of white oak, walnut, poplar, etc. Corn, cotton, lumber, and tobacco are the chief products. Co. seat, Dyersburg.

DYER, ALEXANDER B., 1817–74; b. Va.; graduate at West Point, 1837. In 1864, he was appointed chief of ordnance with the rank of brig.gen. He served in the Florida war in 1837–38; in various arsenals, 1838–46; in the war with Mexico, 1846–48; in various arsenals, 1848–61; and in the ordnance board, 1859. He had charge of the Springfield armory, 1861–64, and served in the ordnance board, 1860–63, and as chief of ordnance in the ordnance bureau in Washington, from 1865 to his death.

DYER, GEORGE, an antiquary and scholar of some eminence, was b. in London, Mar. 15, 1755, and was educated first at Christ's hospital, and afterwards at Emanuel college, Cambridge, which he entered in 1774, and where, after four years' study, he took his degree of B.A. During the next 14 years, he was variously engaged, chiefly at Cambridge, as usher, tutor, and as minister (in the Baptist denomination), but he finally settled in London in 1792. Here he devoted himself principally to literature, and produced, among many works of less note, the *History of the University and Colleges of Cambridge* (Lond., 2 vols., 1814), and *Privileges of the University of Cambridge* (Lond., 2 vols., 1824). He also contributed largely to magazines. He died in London in 1841. D. was a man of remarkable straightforwardness and honesty of character, qualities which are everywhere discernible in his works. He was also a poet, although now forgotten, and never famous.

DYER, Rev. JOHN, an English poet, was b. at Aberglasney, in Caermarthenshire, in the year 1700, and educated at Westminster school. He was intended for the law, but, however, abandoned that study for painting. In 1727, he published his poem of *Grongar Hill,* remarkable for simplicity, warmth of feeling, and exquisite descriptions of nature. He then made the tour of Italy, and returning home in bad health, took orders, and obtained some respectable ecclesiactical preferment. In his didactic poem, entitled *The Fleece* (1754), the difficult subject is treated with great success; but the unpretending tone of the poem made no impression upon his contemporaries. Another poem, *The Ruins of Rome* (1740), abounds in isolated beauties. D. died in 1758. A collected edition of his poems appeared in 1761.

DYER, MARY, one of the victims of the persecution that befell the Quakers in the early years of the Massachusetts colony. Their uncompromising attack on the organiza-

tion of both the church and the civil state, led to the enactment by the legislature of a law of banishment against them under penalty of death if they should return. Mary Dyer left the colony for a time, but soon returned, when she was arrested and convicted, but on being led forth to execution was reprieved, and, against her will, conveyed out of the colony. Returning again, she was hanged on Boston common, June 1, 1660.

DYERS' BROOM, or WOADWAXEN (*genista tinctoria*), a leguminous shrub of European origin bearing yellow flowers and simple leaves, and said to be the bush genêt, from which the Plantagenet family took its name. It is used in Russia for preventing hydrophobia; and formerly in this country its tops were domestically used for a yellow dye, and it was extensively cultivated in New England. Its medicinal value appears to be small.

DYERS' WEED, or ROCKET (*reseda luteola*), a European herb, naturalized in the region of New York, resembling the mignonette. It was formerly used for medicinal purposes, but is now valued chiefly as material for a yellow dye, for which purpose it is largely cultivated in some parts of Europe.

DYE-STUFFS. The substances used in dyeing as the sources of coloring matter, are derived from the animal, mineral, and vegetable kingdoms, the greatest number from the last mentioned. To the animal kingdom, and to the class of insects, we are indebted for *cochineal*—and consequently for *carmine—kermes*, and *lac*, and less directly for *galls*. The *Tyrian purple* of the ancients is also said to have been a product of the animal kingdom, obtained from a mollusk.—The dye-stuffs obtained from the vegetable kingdom are numerous, and in every part of the world there are some in domestic use, which have not become articles of commerce. Such are those dye-stuffs of the Highlands of Scotland, mentioned in the article DYEING. Dye-stuffs are procured from plants of widely different natural families: there are some indeed in which certain coloring matters appear to be extensively prevalent, as in *rubiaceæ* (madder, etc.), and the genus *cæsalpinia* (q.v.). They are also obtained from almost all different parts of plants, as the heart-wood (*duramen*) of the stem (logwood, Brazil-wood, camwood, fustic, etc.); the bark (alder, etc.); the root or its bark (barberry root, etc.); the leaves and other herbaceous parts (indigo, etc.); the corolla (safflower); the fruit (French berries, annotto, etc.). The principal dye-stuffs are the following: *Alkanet* (q.v.), useful in dyeing various shades of lilac, lavender, and violet, which are, however, liable to fade on exposure to light. *Aloes*, obtained by evaporating the juice of the aloe, which is grown in the East and West Indies, Sicily, Italy, and Malta. It contains a brown coloring matter named *aloetin*, which may be employed in the production of a brown tint. *Arnotto* (q.v.), employed in imparting the various shades of yellow, orange, and scarlet, to silk, wool, and cotton. *Archil*, yielding, when infused in water, a crimson dye of great beauty, though fugitive, and used in giving a finish to wool and silk which have been previously dyed. *Barberry root*, imported from the East Indies, and containing a yellow coloring matter called *berberin*. *Brazil-wood*, often called *peach-wood*, containing *brazilin*, which, in contact with the air, yields a rich red color. *Camwood* (q.v.), or *barwood*, has a red color similar to that of Brazil-wood, is generally employed in the form of a coarse powder, and readily imparts its color to water. *Catechu* yields a reddish-brown solution in water, and performs an important office in the dyeing of many shades of brown, black, and green. *Chica* (q.v.), employed in the dyeing of wool and cotton of an orange-yellow color. *Cochineal*, employed directly, or indirectly in the form of carmine (extracted from the cochineal), in imparting the most beautiful red and crimson colors. *French, Persian, Turkey*, or *Spanish berries*, obtained from several species of *rhamnus* (see BUCKTHORN), yield a powerful yellow dye. *Fustet*, the finely divided wood of *rhus cotinus* (see SUMACH), a yellow dye. *Fustic* or *yellow wood*, used for dyeing cloth yellow, and for communicating a good green tint to cloth already rendered blue; as also, in conjunction with other dyes, in imparting various shades of drabs, olives, fawns, etc. *Galls* or *gall-nuts* are employed in dyeing cloth of a dark or black color. *Indigo* (q.v.), very extensively used in the dyeing of yarn and cloth of a deep blue color, which may be afterwards rendered green by a yellow dye. *Kermes, kermes grains*, or *alkermes*, an excellent material for dyeing many shades of red, and one of the most ancient dye-stuffs employed in the coloring of silk. *Lac* (q.v.), *shell-lac*, or *stick-lac*, is used in the preparation of red dyes. *Logwood* (q.v.), broken up into small chips, or reduced to powder, is employed in the dyeing of reds, and, when associated with other substances, yields purples, violets, and blues. *Madder* (q.v.), one of the most important of dye-stuffs, is extensively used in the dyeing of cloth and yarn red, purple, brown, etc. *Munjeet* or *Indian madder* is used in India instead of madder. *Quercitron* yields a rich orange-yellow, or yellow-red dye, capable of being afterwards made a brown; and when used after a blue dye, it changes the latter to a bright green. *Safflower* yields a rich yellow dye. *Sandal-wood, santal* or *Saunders wood*, yields a red color, which, along with other substances, may be altered to violet, reddish-brown, and scarlet. *Sumach*, occasionally called *young fustic*, is employed as a yellow dye, and also for the tannin and gallic acid it contains, which enables decoctions of sumach to be used with great effect for imparting depth or solidity to other colors. *Turmeric*, or *Indian saffron*, is employed as a yellow dye, but is very fugitive. *Weld*, or *wold*, produces a rich but fugitive yellow. *Woad* is employed as a blue dye for woolen and silk yarn and cloth, either with or without indigo. *Wongshy*

is a new yellow dye-stuff procured from the seed-vessels of a plant belonging to the family of *gentianæ*, and imported from Batavia.

The above list of dye-stuffs comprehends those which are obtained, directly or indirectly, from the vegetable and animal kingdoms; and a more lengthened notice of the substances will be found under their respective names. Other dye-stuffs less generally used are also noticed in the articles devoted to different orders and genera of plants. The metallic salts and compounds employed in dyeing will be specially noticed under the various metals; thus, for acetate of lead, see LEAD; sulphate of iron, see IRON; etc.

COAL-TAR COLORS.—The most recent discovery of importance in dyeing, is the extraction of colored substances of great beauty from coal-tar, and the application of these to the coloring of cloth. At the present time, these dyes of coal-tar origin are most extensively employed, and give rise to the fashionable colors named aniline purple, Tyrian purple or mauve, violine, roseine, fuchsine or magenta, solferina, bleu de Paris, aniline green or emeraldine, azuline, etc. It is only, however, within the last 20 years that these dyes have become practically known, though the preliminary discoveries in connection with their extraction were made in 1826. The condensable product or gas liquor obtained during the destructive distillation of coal in gas-works, consists of aqueous matter holding salts of ammonia in solution, and tar with naphtha. The tar consists of a numerous class of bodies, of which aniline and benzole are two. The aniline is present in minute quantity; and for manufacturing purposes, means are generally resorted to for the conversion of the benzole of gas-tar into aniline. The process followed on the commercial scale is to act upon the benzole by nitric acid, by which it is converted into nitro-benzole, and therefore, by the action of acetate of the protoxide of iron, it becomes aniline.

Aniline Purple.—In the preparation of the dye known as aniline purple, solutions of equal equivalents of sulphate of aniline and bichromate of potash are mixed together; and when the reaction is complete, a black precipitate is obtained, which is dried, and then digested several times in coal-tar naphtha, to separate all resinous matter. The residue is dissolved by successive quantities of alcohol; to the solution being placed in a retort, the alcohol is distilled off, and the aniline purple is left as a beautiful bronze-colored substance. Aniline purple is slightly soluble in cold water, more so in hot water, and is readily dissolved by the alcohols and aniline itself. It is nearly insoluble in ether and naphtha.

Roseine is most readily prepared on the commercial scale by adding two equivalents of binoxide of lead to a boiling solution of one equivalent of sulphate of aniline, and boiling the whole for a short time. On filtration, a rose-colored solution is obtained, which is evaporated down to small bulk, when some resin separates, and the roseine is precipitated by soda or potash, and being collected on a filter, can be washed and dried. This dye is readily soluble in alcohol, and yields a very intense crimson color, which, on being evaporated to dryness, leaves a dark metallic-looking and brittle residue of roseine. It is soluble in water, but not in naphtha.

Violine is procured by the oxidation of aniline, and the process generally followed is to heat a mixture of two equivalents of sulphuric acid, one equivalent of aniline, and some water, to the boiling-point, then add binoxide of lead, boil for some time, and filter hot. A purple liquid is obtained, which is boiled with potash till the aniline present is volatilized, and the coloring matter is precipitated, when the latter is thrown on a filter, washed with water, and dissolved in a dilute solution of tartaric acid. On filtration, the colored liquid is evaporated to small bulk, refiltered, reprecipitated by potash and soda, and the precipitate being dissolved in alcohol, yields an alcoholic colored solution, which, on distilling off the alcohol, leaves the violine as a brittle bronze-colored substance. Violine is very slightly soluble in water, is readily dissolved by alcohol, and is insoluble in ether and naphtha.

Fuchsine or *magenta* is prepared by adding anhydrous bichloride of tin by degrees to aniline. The materials are constantly stirred during the operation, to keep down the intensity of the action, and the result is, that much heat is evolved, the mixture becomes pasty, then liquid and brown; and as the temperature approaches the boiling-point, it becomes a dark, almost black liquid, which in very thin layers presents a rich crimson color. This liquid is boiled for some time, much water added, the whole reboiled, so as to volatilize any free aniline, and chloride of sodium (common salt) added till saturation, when the fuchsine or magenta is precipitated as a golden green, semi-solid, pitchy substance. Any resinous matter still remaining may be separated by digestion in benzole. This dye may also be obtained by acting upon aniline with nitrate of mercury. Fuchsine or magenta is sparingly soluble in water, dissolves to some extent in alcohol, and is insoluble in ether and naphtha.

Bleu de Paris is prepared by heating 9 parts by weight of bichloride of tin and 16 parts of aniline to a temperature of about 350° F., in a sealed tube, for 30 hours, when a blue product is obtained, which is soluble in alcohol, and crystallizes therefrom in fine needles of a lively blue color. Bleu de Paris is soluble in water, alcohol, wood-spirit, and acetic acid, and insoluble in ether and bisulphuret of carbon.

Aniline Green or *Emeraldine* is obtained by acting upon a hydrochloric acid solution of aniline by chlorate of potash, when the aniline becomes oxidized, and yields a dull-

green precipitate, which, on drying, becomes an olive-green residue. It is insoluble in water, alcohol, ether, and benzole, and in the presence of a free acid the green color improves in appearance, though it returns to its original shade when the free acid is removed.

Quinoline or *Chinoline* is present in coal-tar, and may be employed to yield three coloring matters—a violet, a blue, and a green; but the processes as yet followed in their preparation belong more to the laboratory experiments of the scientific chemist than to the practical operations of the manufacturer.

Picric Acid is obtained by acting upon many organic substances, such as indigo, aniline, carbolic acid, salicin, silk, aloes, gum-resins, etc., by nitric acid. On the commercial scale, carbolic acid is generally employed, and it is first treated with nitric acid of slightly less density than 1300 (water = 1000), and afterwards boiled with stronger acid, when it passes into picric acid, and is precipitated on dilution with water. It can be purified by recrystallization from boiling water. Pure picric acid crystallizes in lamina of a primrose yellow color.

Azuline is the only other coloring matter of practical importance derived directly or indirectly from coal-tar. It is a brittle, non-crystallizable substance, with a copper-colored metallic appearance. It is sparingly soluble in water, but is soluble in alcohol, yielding a fine blue solution with a shade of red. Treated with concentrated sulphuric acid, it becomes a fine blood-red liquid, which, on dilution with much water, gives a red precipitate of azuline.

Pittacal is a blue coloring matter obtained from coal-tar.

Dyeing of Silk and Wool by the Coal-tar Colors.—This department of the operations of the dyer is very simple, as the silk and wool fibers possess the power of taking up and fixing the majority of these coloring matters with great rapidity, whenever the yarn or textile fabric is placed in the vessel containing a solution of the color. In the dyeing of silk with aniline purple, violine, and roseine, the alcoholic solution of the color is diluted with 8 times its volume of hot water acidulated with tartaric acid, and thereafter treated with a larger quantity of cold water. The silk is merely worked in this comparatively weak solution of the dye till the shade of color is deep enough. The addition of a little sulphate of indig to the dye-vat assists in bringing out a more decided blue tint. The same result is obtained by first dyeing the goods with Prussian blue before immersion in the coal-tar color. When silk is to be dyed with fuchsine, picric acid, chinoline blue or chinoline violet, the goods require only to be worked in water-solutions of these colors. A little acetic acid added to the vat containing the fuchsine or picric acid is advantageous, and if a solution of sulphate of indigo is mixed with the solution of picric acid, the goods acquire a fine green color.

Azuline is attached to silk with more difficulty than any of the preceding colors. The silk requires to be worked first in a solution of azuline acidulated with sulphuric acid, and thereafter the liquid is raised to the boiling-point, and the silk continued to be worked in it. The goods are then washed in water, worked in a bath of soap-lather, rinsed, and finished in a weak acid bath.

Wool is dyed with aniline purple, violine, roseine, fuchsine, and chinoline by merely working the yarn or cloth in a vat containing a water-solution of the coloring matter at a temperature ranging between 112° and 140° F.

Cotton has not the power of firmly attaching, directly, coal-tar colors to its fiber so as to resist the action of soda and of soap. When the cotton, however, is treated with a solution containing much tannin, such as a decoction of sumach, or galls, for an hour or so, then introduced into a dilute solution of alum or stannate of soda, and, lastly, passed into a dilute acid liquid, and washed in water, it acquires a great power of firmly attaching aniline purple, roseine, violine, fuchsine, and chinoline colors, whenever it is worked in a dye-vat containing these coloring matters. This principle of the attachment of these colors to cotton by means of a mordant of tannin and alum, may be applied in printing patterns upon cloth, as in calico-printing (q.v.). The pattern is printed on the cloth by means of tannin and alum dissolved in water, and thickened with gum; and afterwards, when the prepared goods have been introduced into a hot dilute acid solution of the coloring matter, the dye becomes attached to those parts on which only the tannin has been printed, and leaves the other parts uncolored. Another mode is to mix the dye with albumen or lacterine, print on the cloth, and then subject to the action of steam, which coagulates the albumen or lacterine, and at the same time fixes the color on the cloth.

DYING DECLARATION. By the law of all nations, the declaration of a party, made in the immediate prospect of death, relative to the mode of his death, is received as evidence. The ground of this exception to the general rule of law, that hearsay evidence is inadmissible, is thus clearly stated by lord chief baron Eyre: "That they are declarations made in extremity, when the party is at the point of death, and when every hope of this world is gone; when every motive to falsehood is silenced, and the mind is induced, by the most powerful considerations, to speak the truth: a situation so solemn and so awful is considered by the law as creating an obligation equal to that which is imposed by a positive oath in a court of justice." In Scotland, the dying declaration of a witness is admissible even though he is not himself conscious of the danger of death.

In this respect, the law of Scotland differs from that of England and America. The general rule as to dying declarations are, that they cannot be received in any civil case, and in criminal cases only where the death of the deceased is the subject of the charge, and the circumstances of the death are the subject of the dying declaration. They must be made, except in Scotland, with the full knowledge of impending death; they are subject to the ordinary rules of law as to capacity to give evidence; they must relate to facts only, and not opinions, and must be freely made; they must be complete in themselves, and if it appear that the dying man intended to qualify them, they cannot be received. See Taylor on *Evidence*.

DYKE, or DIKE (Dutch, *dyk*), an artificial mound along the bank of a river or seashore, erected for the purpose of preventing inundation. The term is from the same root as *dig*—hence also *ditch*, or the hollow from which the D. is formed. The French employ the term *levée* to signify this species of embankment, of which there is a notable example in the levées erected along the Mississippi near New Orleans. The principle on which dykes or levés are formed is very simple. The embankment must be of sufficient breadth and height to resist the pressure of the water, and must be constructed with that easy slope which will allow the floods to rise without any particular impediment. This is quite understood in practical engineering. Flowing water must not be abruptly resisted, but suffered to rise gradually and expend itself. It is accordingly of the first consequence, in all attempts to restrain water by embanking, that the mounds should possess not only magnitude, but a very gradual rise in the side which has to resist the impact of the flood. For want of attention to this method of embanking, there has often been much ineffectual dyking of the sea and rivers liable to do damage by flooding.

In no country has the erection of dykes been carried to such a length as the Dutch Netherlands. Consisting to a large extent of low meadow-land, formed of materials brought from Switzerland and Germany by the Rhine, there is a constant liability to be deluged by the several branches of that river previous to their entering the sea. Inspired by a sense of their perilous situation, as well as a naturally industrious and painstaking disposition, the Dutch have for ages been distinguished for their ingenious system of river-embanking; till at length the dykes of Holland are spoken of as almost one of the wonders of the world. While the country generally is guarded against sea-inundations by high mounds of sand or dunes, created by the deposit of light sand blown from the level shores (see DUNE), the interior is secured from the rivers by the system of dykes here referred to. These ramparts are in appearance long green mounds, broad at the base, graduated in their slope, and often of sufficient width to admit of a canal or road, or both, being formed along the top. To give strength to the fabric, willows are planted and also interwoven like wicker-work on the sides. Carried along the banks of rivers, and in some places along the margin of the sea, as well as crosswise in different parts of Holland, a singular network of embanking is presented, which answers the double purpose of a protection from inundation and a means of having canals, by which superfluous water pumped from the meadows, or *polders*, may be run off into the sea. The whole system of dyking is placed under local and general superintendence, at a considerable cost to the public. One of the most gigantic of these dykes is that along the Helder; it measures about 6 m. in length, 40 ft. broad at the summit, along which there is a good road, and descends into the sea by a slope of 200 ft., inclined about 40 degrees. Notwithstanding the precautions taken, one or other of the lower branches of the Rhine occasionally overflows its banks and lays a wide district of country under water. One of these inundations took place in the winter of 1860–61, and, committing immense havoc, was the cause of much loss and suffering. A good example of dyking for the purpose of drainage is shown near Haarlem, where it has facilitated the withdrawal of the Haarlem lake (q.v.).

DYKES. In volcanic districts, rents frequently occur which are filled with molten materials from below, that subsequently solidify, and form solid walls, filling the fissures, and separating the edges of the disjointed strata. To these walls, geologists apply the term dyke, a Scottish word for a wall or fence. Similar walls of intruded matter occur in stratified rocks of all ages, and have been connected with volcanic eruptions belonging perhaps to every geological epoch. They consist of similar materials to whatever period they belong—viz., lava, either in a granular, compact, or glassy condition. The D. connected with Vesuvius have been minutely described. Those in the great escarpment which Somma presents to the modern crater of Vesuvius permit of a careful examination. They are chiefly vertical, and traverse at right angles the beds of lava, scoriæ, breccia, and sand which form the ancient cone. They project in relief several inches, or sometimes feet, from the face of the cliff, being extremely compact, and less destructible than the intersected tuffs and porous lavas. In vertical extent they vary from a few yards to 500 ft., and breadth from 1 to 12 feet. Many of them cut all the inclined beds in the escarpment from top to bottom, others stop short before they ascend above half-way, and a few terminate at both ends, either in a point or abruptly. In mineral composition, they scarcely differ from the lavas of Somma. Their texture is different at the edges and in the middle; towards the center, the rock is larger grained, while at the edge it is always finer grained, sometimes vitreous. This evidently arises

from the rate of cooling, it being known that molten trap or lava, when suddenly cooled, assumes a vitreous structure, while a slow cooling, as it permits the mass to remain in a condition fitted for the operation of the crystalline force, and the segregation of the separate materials, produces a more or less granular structure, in proportion to the time occupied in cooling. The rock forming the D. is far more compact than that of ordinary lava, for the pressure of a column of melted matter in a fissure greatly exceeds that in an ordinary stream of lava; and pressure checks the expansion of those gases which form vesicles in lava. When the fissures have been openings for the egress of molten matter, the surfaces have been worn and smoothed by the current, the intense heat having melted all projections and obstructions to the passage of the incandescent fluid.

The appearances of ancient trap-dykes are very similar to those of recent volcanic dykes. Trap-dykes generally are prominent objects in the landscape, because, while the softer rocks through which they have intruded have been abraded by the sea, rivers, or rain, they, being more compact, stand out prominently in the face of precipices or on the level surface of a country. Sometimes, however, from chemical action, and chiefly from the oxidation of the iron which all trap-rocks contain to a greater or less extent, the intruded dyke decomposes more rapidly than the containing rock. It then for some feet or yards leaves the original fissure again unoccupied. A singular modification of this arrangement may sometimes be noticed, when the intrude digneous rock has so indurated the beds through which it passed as to make them less liable to weather than the unaltered portions of the beds, or than even the dyke itself. In such cases, we find two parallel walls of indurated strata rising above the general level of the country, and forming the banks of a ditch produced by the disappearance of so much of the dyke. All these appearances may be observed in the island of Arran, a locality unsurpassed for observing those remarkable geological phenomena. Some D. have had no apparent influence on the adjoining strata, even when these consist of materials most liable to be affected by heat. Thus, seams of coal sometimes remain unaltered, though in contact with the supposed injected molten matter. Considerable doubt is thus cast upon the generally received opinion, that in all cases D. were intrusions of lava. The effects that have been produced in numerous instances can, however, only be accounted for by supposing that the adjacent rocks have been affected by heat. The writer has observed in Arran, at a place where a dyke cut at right angles an older one, that the edges of the older dyke which had been acted upon by the current of liquid lava, were converted into true obsidian to the depth of nearly half an inch. In Anglesea, shale at the edge of a dyke 134 ft. wide has been converted into hard porcellanous jasper; and argillaceous limestone loses its earthy texture, and becomes granular and crystalline. The chalk, in Antrim, is converted, by basaltic D., into granular marble. Coal, as might have been expected, is often altered in an extraordinary degree. Witham describes the effects of the Cockfield Fell dyke on a seam of coal through which it passes. It is a nearly vertical wall of trap, 18 or 20 yds. thick, and is traceable to a distance of 70 m., running in a s.e. direction. The coal is about 6 or 8 ft. thick, and is affected about 50 yds. from the dyke. It first loses the calcareous spar, which occurs in the joints and faces, begins to look dull, and loses its quality for burning. As it comes nearer, it assumes the appearance of a half-burnt cinder; and approaching still nearer the dyke, it grows less and less in thickness, becoming a pretty hard cinder only two feet and a half in thickness. Eight yards further, it is converted into real cinder; and more immediately in contact with the dyke, it becomes a black substance resembling soot caked together, the seam being reduced to 9 in. in thickness. The coal thus deteriorated is 25 yds. of bad short coal, half reduced to cinder; 16 yds. of cinder; and 10 of sooty substance.

DYMOND, JONATHAN, 1796–1828; an English writer, a member of the Society of Friends. He was an expositor of the moral principles of his sect, and though actively engaged in business, published, in 1823, an *Inquiry into the Accordance of War with the Principles of Christianity*, which attracted wide attention. He also wrote *Essays on the Principles of Morality, and on the Private and Political Rights and Obligations of Mankind*, published after his death.

DYNAMETER, an instrument for measuring the magnifying power of a telescope. The power of a telescope is found by dividing the solar focal distance of the object glass by the focal distance of the eye-piece; which quotient equals that of the effective diameter of the object glass, by the diameter of the image formed at the solar focus, and seen through the eye-piece. The object of the dynameter is to measure the diameter of this image. Ramsden divided a positive eye-piece into two equal parts, and caused the halves to slide along at the dividing line, by means of a fine screw apparatus. Each half lens gives a separate image, and the distance of the two centers, measured by the turns of the screw which bring the images into contact, gives the distance between the centers of the images, or the diameter of one of them.

DYNAMICS is that division of mechanics (q.v.) which contains the doctrine of the motion of bodies produced by forces. It is essentially a science of deduction from the laws of motion (see MOTION, LAWS OF), under which head will also be found a brief sketch of the growth of the science. The branches of D. capable of being treated in the present work will be found discussed under separate heads. We shall here confine

ourselves to giving a view of the main branches and their correlation. I. The first branch of D. deals with the fundamental conceptions of the science, their names and definitions, such as velocity (q.v.) and the different kinds of motion (q.v.), and accelerated motion (q.v.); force, accelerating force, and moving force (see FORCE). Under this branch also falls the composition of motions (see COMPOSITION OF FORCES AND MOTIONS). II. The second main branch of D. treats of the motion, free or constrained, of points. Here two problems are solved in each case—i.e., whether the motion be free or constrained—viz., a direct and an inverse problem; as, for example: 1. To determine the path of a point when the forces are given which act upon it; 2. To determine the forces or force acting on a point when its path is given. This division of dynamical problems into direct and inverse, obtains in all the branches. It may be mentioned that it was by solving the inverse problem that Newton and Huygens effected their greatest glories in connection with dynamics. The method of treating the case of a free point now generally employed, is due to Euler. See, under this head, CENTRAL FORCES; FALLING BODIES, and PROJECTILES. III. The third main branch of D. is concerned with the motion of a rigid system of points, or of a solid body. Few of the sub-branches of this part of D. are capable of exposition in this work, but see CENTER OF GYRATION, CENTER OF OSCILLATION, CENTER OF PERCUSSION, and PENDULUM. The honor belongs to D'Alembert of establishing a general method of treating problems in rigid dynamics. Previous to his time, each set of such problems was treated on some principle peculiarly applicable to itself. D'Alembert invented one (which goes by his name) applicable to all such problems. For a statement of this principle, see RIGID DYNAMICS. IV. The fourth main branch of D. is concerned with motions of rotation. A system of rigid points may be subject to two independent kinds of motion. It may suffer a motion of *translation* in space, or a motion of *rotation* about some point or axis within itself, or it may suffer at once a motion of translation and a rotatory motion. These may clearly be treated conjunctly or independently; they are now uniformly treated independently, by investigating, 1. The velocity and direction of the center of gravity of the system; and 2. The direction at each instance of the spontaneous axis of rotation passing through the center of gravity (see ROTATION), and the velocity of the rotation of the system round that axis. To effect the second task, Poinsot proposed his theory of couples (q.v.). For the conservation of living forces (*virium vivarum*), and the principal of least action, see FORCES. See also MOMENT. D. is used by some recent writers with a wider signification, as denoting the science which investigates the action of force (1) in compelling rest or preventing change of motion, and (2) in producing or changing motion; the former branch being called *statics*, and the latter *kinetics*.

DYNAMIC UNITS are units for measuring forces and their effects. It is an axiom of mechanics that if a body at rest be impressed by a force, and meet no resistance other than its own inertia, it will move in a straight line with a velocity which varies as the force; e.g., twice the force will develop twice the velocity. Also, if the mass of the body be increased, the force must be increased in like ratio to maintain the same velocity; e.g., double the mass will require double the force; or, if the force remain unchanged, double the mass will move with half the velocity. Combining the two statements, we find that the velocity varies directly as the force, and inversely as the mass; velocity equals force divided by mass, or $v = \frac{F}{M}$. From this we have $F = Mv$. The unit of force is that force which will impart a unit of velocity to a unit of mass; that is, which will cause a unit of mass to move through a unit of space in a unit of time. If the force considered be that of gravitation, whose action in the same place is practically uniform, and if we remember that the measure of the force of gravitation in a body is the weight of the body, we have $W = Mv$. But if the mass be submitted to the force of gravitation, that is, if it be permitted to fall freely in a vacuum, it traverses a space of 32.16 ft. in one second, at New York, approximately. We have then, by experiment, a value for v which makes our equation $W = M \times 32.16$, whence $M = W \div 32.16$. The English or American unit of force is one pound avoirdupois; and the corresponding unit of mass is 1 lb. divided by 32.16.

The *unit of work* is the force which will raise a unit of weight through a unit of space. The two items are indicated in the name foot-pound, which by analogy might be exchanged in proper ratio for inch-ounce, ton-mile, etc. The corresponding French unit of work is the kilogram-meter. More generally the foot-pound is the work of a unit of force acting through a unit of space. The horse-power is an arbitrary unit, being the force required to perfom 33,000 units of work in one minute. It may be called the *unit of the rate of working*. The French *cheval a vapeur* is 75 kilogram-meters per second, and is equal to 32.550 foot-pounds per minute, or a little less than our horse-power. The theoretical horse-power is merely a conventional quantity, the actual work of horses averaging about 17,000, and rarely exceeding 22,000 foot-pounds per minute.

DYNAMITE, a powerful explosive compound, now much used in mining, in breaking up old metal, in torpedoes, etc. The names lithofracteur, glyoxiline, nitrate of methyl, etc., are applied to the same or similar substances, of which nitro-glycerine is the main ingredient. See NITRO-GLYCERINE.

DYNAMOM'ETER, a device for measuring the force which does work in overcoming resistance and producing motion. The foot-pound, as a unit of work, has for its factors the force acting and the distance through which it acts. The larger unit, the horse-power, besides these factors has a third, the time during which the force is exerted. Hence, in getting the data from which the work of a machine is to be calculated, we are to observe the force, the distance, and the time required to accomplish a certain result. Strictly speaking, the dynamometer indicates the first of these items, but it may be so arranged as to show both the others. Dynamometers are designed to indicate the force of *traction, of thrust, or of rotation.* A traction dynamometer may be interposed, for example, between a team of horses and a reaper or a plough, to measure the force exerted by the horses in drawing the machine. It is usually some sort of spring balance, fitted with an index and a scale; the figures on the scale show the number of pounds required to bring the index to the corresponding points, if the instrument were hung up and weights suspended by it. A dynamometer for thrust is often connected with the screw-shaft of a steamship, to measure the force with which the screw is driving the vessel through the water. Rotary dynamometers measure the force of a mill-shaft, either by showing what force is required to hold the shaft in check, by absorbing the motion, or what force the shaft transmits to other machinery. Nearly all forms of dynamometers are too complex to be described without the help of elaborate drawings and technical descriptions, for which the reader is referred to special works on mechanism. The use of the dynamometer in skillful hands has acquired great value in exchanging the rough and usually overestimated guesses of the efficiency of machines for the exact determination of their performance.

DYRRHA'CHIUM. See DURAZZO, *ante.*

DY'SART, a royal, parliamentary, and municipal burgh and seaport in the s. of Fifeshire, on the rocky shore of the firth of Forth, 12 m. n.n.e. of Edinburgh. It chiefly consists of 3 streets, with a small square. In the High street are many antique houses, with inscriptions and dates. It has ship-building, flax-spinning, and manufactures of damasks and ticks. In the vicinity are coal and ironstone mines. Pop. '71, 8,919. It unites with Kirkcaldy, Burntisland, and Kinghorn, in sending a member to parliament.

DYSCRA'SIA (Gr. *dys,* difficult, and *krāsis,* a mixture), a pathological term much used in Germany by certain authorities, to indicate an altered condition of the blood and fluids of the system, leading to constitutional diseases, as dropsy, cancer, delirium tremens, lead-poisoning, etc. See CACHEXIA and DIATHESIS.

DYSENTERY (Gr. *dys,* difficult, and *enteron,* the intestine), a form of disease attended by discharges from the bowels, and differing from diarrhœa (q.v.) chiefly in being attended by marked fever and pain, as also by the presence of blood and inflammatory products in the discharges. Dysentery is, in fact, a disease of the mucous membrane of the colon (q.v.) or great intestine, and when severe, it is followed by the destruction of that mucous membrane to a great extent, the intestine becoming much contracted at intervals, especially in its lower part, and the evacuations being therefore apt to be retained, especially the solid portions. The most distinctive symptoms are excessive pain in evacuating the bowels, and frequent ineffectual attempts at evacuation (*tenesmus*), tenderness on pressure in the left side of the abdomen, discharges of blood mixed with mucus, and comparatively little fecal matter; these symptoms being accompanied or followed by intense fever, passing into early depression of strength. Dysentery is a disease of extreme danger in many cases, and should always be placed early under medical treatment. The best domestic plan, when medical advice cannot be at once procured, is to give a moderate dose of castor-oil, guarded by 20 or 30 drops of laudanum, and then either Dover's powder in ten-grain doses every hour or two, or ipecacuanha wine in two or three successive teaspoonful doses at similar intervals, each with 10 or 20 drops of laudanum, according to the effect on the system. If vomiting is repeatedly produced, the dose of ipecacuanha wine should be lessened. If the pain and irritation of the bowels are extreme, the opium had better be given by a small injection (see CLYSTER) with starch, after the lower bowel has been well cleansed by a larger warm-water injection; and it will be well to repeat the simple warm-water injection at intervals throughout the treatment. Dysentery, in its most severe forms, is commonly a disease of the tropical zone. It is often found in connection with inflammation of the liver.

DYSENTERY (*ante*). Two forms of dysentery are usully recognized by medical authorities, sporadic and epidemic. The causes, however, are supposed to be the same in both. It is essentially a disease of hot weather, or hot climates. There being no doubt of the epidemic character of the disease in certain seasons and in certain localities, it follows that a peculiar poison must be the generating cause, heat perhaps operating to aid in generating the poison or contagious matter. Post-mortem examinations show the mucous membrane of the colon and rectum (see ALIMENTARY CANAL) to be the seat of much morbid action. Extensive ulcerations are frequently found, which are the seats of the hemorrhage or bloody discharges, having been caused by the inflammation of the parts, abundant evidence of which exists, the membrane often being found greatly engorged with blood, thickened and pulpy, in some cases of a very dark color and almost disorganized. The portal circulation (see LIVER) is greatly obstructed

in nearly all cases, probably in all severe cases, and it is certain, under the circumstances, that the peculiar *materies morbi* or morbid principle or matter of dysentery paralyzes or greatly arrests the functions of this organ. Now, as all the blood from the intestines passes through the liver on its return to the lungs and heart, the functional disturbance which exists in this organ must necessarily produce more or less obstruction in the capillary circulation in the intestines, and greatly interfere with their nutrition and relative functions. Practically, therefore, the treatment of the disease involves the consideration of those remedies which are supposed to exert a decided influence upon the functions of the liver. One of these remedies, which has been greatly lauded, and also greatly condemned, is mercury, particularly that preparation of it called *calomel;* one party contending that the administration of the drug in minute and repeated doses (especially when alternated with alkaline carbonates to restore the alkalinity of the blood) exerts a powerful influence in restoring the tone of the capillary circulation in various organs, and consequently their functional activity; above all, that this power is peculiarly manifested with reference to the liver; and they adduce numerous examples to establish the correctness of their opinions. On the other hand, several eminent authorities deny the correctness of the theories and positions of these advocates, and affirm that their experience and experiments, as well as all sound therapeutical theories, are decisive against the opinion that calomel possesses the peculiar virtues which are claimed for it. If this remedy be used, it should be in minute and frequently repeated doses—$\frac{1}{8}$ to $\frac{1}{4}$ of a grain every 2 hours; and sometimes oftener—$\frac{1}{16}$ to $\frac{1}{8}$ of a grain every hour. It should always be combined with sufficient opium in some form to allay the griping and other pain, and arrest the straining. Alkaline carbonates should also be given. It is recommended by many authorities that when a laxative is given in the commencement of the treatment, a saline, as sulphate of magnesia or Rochelle salts, should be preferred. Hygienic measures are of the greatest importance. The strictest attention should be paid to cleanliness and ventilation. Pure, fresh air is necessary, not only as a tonic to the nervous system, but as one of nature's principal means of eliminating effete and poisonous matter. Counter-irritants in the form of sinapisms, made weak and continued, are frequently of great advantage in aiding to restore the capillary circulation in the diseased parts, by arousing a reflex influence in the nervous system. The diet is of no secondary importance, and should be bland and nutritious. Eggs, raw or very slightly boiled, mixed with Catawba or sherry wine, or brandy; rice water, as a beverage, combined or alternated with beef-tea, will often afford nourishment not easily supplied in other ways. Rare beefsteak, if chewed and the juice swallowed, often affords a good form of food; toast and tea also may be taken. Tea for the sick-room should always be of the most delicious kind, and freshly prepared, and *weak*. Pure water, actively boiling, should be poured upon a proper quantity of tea in an earthen vessel, and allowed to stand not more than two or three minutes before being turned off, as the continued presence of the leaves allows of the absorption of too much tannin and other extractive matter, by which the fragrance and best qualities of the beverage are injured.

DYSLYSINE is an organic substance ($C_{18}H_{36}O_6$) obtained by boiling choloidic acid with hydrochloric acid for some time. It is a neutral resinous body, which is difficultly soluble in naphtha, turpentine, and other common solvents.

DY'SODIL, a yellow or grayish laminated bituminous mineral, often found with lignite. It burns vividly, and diffuses an odor of asafetida.

DYSPEPSIA (Gr. *dys*, difficult, and *pepsis*, digestion), a scientific term for indigestion (q.v.).

DYSPHO'NIA, signifying primarily difficult speaking, of which the most common example is the disease popularly known as "clergyman's sore-throat." It is attended with inflammation, huskiness, coughing, expectorating, and sometimes ulceration. Rest of the vocal organs, muscular exercise, tonics, and change of air and scene, are helpful towards recovery. It is a recent theory that, with preachers, this trouble arises from the forcible use of the voice only one day in seven, after six days of quietness—the injury arising not from the use, but from the sudden and violent change involved in the use; thus indicating as a remedy or preventive such daily vocal exercise as shall avoid a sudden strain on any one day.

DYSPNŒ'A (Gr. *dys*, difficult, and *pnœa*, breathing), a word the meaning of which is sufficiently indicated by its etymology. See ASTHMA; RESPIRATION, ORGANS AND PROCESS OF.

DYSU'RIA (Gr. *dys*, difficult, and *ouros*, urine), a difficulty of passing urine. It may depend on a variety of causes, as regards which, see BLADDER; and URETHRA.

DYTISCUS (Gr. *dytes*, a diver), a Linnæan genus of aquatic coleopterous insects or water-beetles, now forming the tribe or family *dytiscidæ*. They are *pentamerous* coleoptera; that is, have all the *tarsi* five-jointed. Their general form is oval, the outline little broken, and the surface very smooth. The respiratory organs of the perfect insect are not adapted to the extraction of air from water, and it must occasionally come to the surface to breathe, where it rests for a short time back downward, and with the extremity of the abdomen exposed to the air, the openings of the air-tubes being in the last

segment. The *dytiscidæ* are excessively voracious, feeding upon any kind of animal food, and boldly attacking creatures larger than themselves. They are very amusing inmates of the fresh-water aquarium, and sometimes live in it for a year or two, getting tame, and readily coming to be fed with small earth-worms, bits of beef, etc. The species are numerous, and vary much in size, some being very small, and some almost 2 in. in length. A very common British species is *D. marginalis*, about an inch and a quarter in length, of a dark olive color, the thorax and outer sides of the elytra margined with yellow. All the species are found in lakes, ditches, marshes, and the still parts of rivers. They often leave the water by night, and can fly well. Their larvæ have the body long and tapering, composed of eleven rings or segments, besides the head. They hide themselves in the earth, in chambers which they make for themselves, before changing into pupæ.

DY'VEKÉ (i. e., *dove*), called by the Latin chroniclers Columbula, the mistress of Christian II. of Denmark, has been often celebrated in works of poetry and fiction. She was born in Amsterdam in 1488, and Christian became acquainted with her in 1507, in Bergen, where her mother, Sigbrit Wylms, had settled as an innkeeper. She followed him to Opslow, and, when he mounted the throne, to Copenhagen. Notwithstanding the marriage of Christian with Isabella, the sister of the emperor Charles V., his relation with D. was continued, and her mother acquired unbounded influence in the affairs of the country. Though D. herself never interfered, she was naturally hated by the party of the nobles; and her death, which happened suddenly in 1516, was attributed, with almost certainty, to poison. The poison was understood to have been administered to her in cherries by the noble and proud relations of the governor of the palace, Torben Oxe, who was a suitor for the affections of Dyveké. On her death, the character of Christian broke out in all its savageness. He first ordered the treasurer Faaburg to be executed for having said that Torben Oxe had enjoyed the favor of D.; and then at the instigation, as was given out, of a nightly vision, Torben Oxe himself. Samsöe, a Danish poet, wrote, about the end of the 18th c., a tragedy called *Dyvĕke*, often represented in Copenhagen. The story has since been made the subject of several novels and tragedies; e. g., *Wilhelm Zabern*, by J. C. Hauch, a Dane; and Riekhoff's tragedy, *Düveke* (Berl. 1843).

DY'VOUR AND DYVOUR'S HABIT (from the Fr. *devoir*, to owe; a debtor). In the old legal language of Scotland, a D. seems to have been synonymous with a bankrupt. Skene speaks of a D. or "bairman" (bare-man), as one who, "being involved and drowned in debts, and not able to pay or satisfy the same, for eschewing of prison and other pains, makes cession and assignation of all his goods and gear in favor of his creditors, and dons his devour and duty to them, proclaiming himself bairman and indigent, and becoming debt-bound to them of all he has." It was ordained by act of sederunt (q.v.) of 17th May, 1606, that a pillory be erected near the market cross of Edinburgh, with a seat upon it, upon which dyvours shall be exposed once on a market day; and before their liberation from jail, they are required to provide themselves with a hat or bonnet of yellow color, to be worn by them while thus exposed, and constantly thereafter, while they continue dyvours, under pain of three months' imprisonment if they be found without it. By subsequent acts (26th Feb., 1699, and 23d Jan., 1673), the dyvour's habit is appointed to be a coat or upper garment, half yellow and half brown, with a party-colored cap or hood, to be worn on the head; any of his creditors being entitled to imprison him if he be found without it. The act of sederunt of 18th July, 1688, prescribes as the dyvour's habit, "a bonnet, partly of a brown and partly of a yellow color, with uppermost hose, or stockings, on his legs, half brown and half yellow colored, conform to a pattern delivered to the magistrates of Edinburgh, to be keeped in their tolbooth;" and declares that the lords will not hereafter dispense with it, unless in the case of innocent misfortunes. Finally, by statute (1696 c. 5), the lords of session are prohibited from dispensing with the dyvour's habit unless, in the process of cessio bonorum (q.v.), the bankrupt's failure be alleged and proved to have been by misfortune. This statute is repealed, and the dyvour's habit abolished, by 6 and 7 Will. IV. c. 56—previous to which time the barbaric practice of wearing the habit had, by sufferance of the court, been departed from.

DZE'REN. See ANTELOPE

DZIG'GETHAI, DJIGGETAI, KIANG, KHUR, or GOOR, *Equus hemionus*, a quadruped nearly allied to the ass, and believed to be the *hemionus* of Herodotus and Pliny. See Ass. It inhabits the elevated steppes of Tartary, extending into the s. of Siberia and to the borders of India. In appearance and characters, it is intermediate between the horse and the ass, whence the ancient Greek name *hemionus* (half-ass). In size it approaches the horse, which it resembles also in gracefulness of action, and in its neighing, which is even more deep and sonorous. Its general shape is much like that of a mule. The D. lives in small herds, sometimes of several males and several females, sometimes of a single male with about twenty females and foals. It is an animal of great fleetness and shyness, or watchfulness, and possesses also great powers of endurance in flight, so that it is with difficulty killed by the hunter. The Mongols and Tungûs, however, hunt it very eagerly on account of its flesh. It has been domesticated

and reduced to the service of man, but there does not seem to be any evidence of its ever breeding in a state of domestication.

DZUNGA'RIA, or SONGARIA, a former Mongolian kingdom of central Asia, destroyed by the Chinese invasion about 1757–59. It included most of that part of central Asia extending from 35° to 50° n., and from 72° to 97° east. A part of this territory is now known as the Chinese province of Thian-Shanpelu.

E

E, THE fifth letter in the Greco-Roman alphabets. Its original and fundamental sound is that heard in Eng. *tent.* The sound heard in *me* is not given to it in any language but English. In the series of vowels it stands intermediate between *i* and *a*. See LETTERS AND ARTICULATE SOUNDS, where the various vowel-sounds represented by the character *e* in English will be noticed.

E, in music, is the third note or sound of the natural diatonic scale, and is a third above the tonic C, to which it stands in proportion as 5 to 4. As a major third, that is, when the tonic C vibrates 4 times, the E above vibrates 5 times. E is the third harmonic which arises naturally from C as a fundamental note. E major, as a key, has four sharps at its signature, viz., F, C, G, and D sharp. E minor, as a key, has only one sharp, F, same as G major, of which E is the relative minor.

EACHARD, JOHN, D.D., 1636–97; an English divine, educated at Cambridge, where he became master of Catherine hall. He was a doctor of divinity, and for two terms vice-chancellor of the university. He published a number of half-satirical attacks upon the clergy, among them *The Ground and Occasions of the Contempt of the Clergy inquired into, in a Letter to R. L.*; and, in answer to attacks upon this work, he issued *Some Observations, etc., in a Second Letter to R. L.* He attributed the contempt into which the clergy had fallen to their imperfect education, their insufficient incomes, and the want of a true vocation, giving amusing illustrations of the poverty and absurdity of the pulpit oratory of the day. In a similar vein of satire, he attacked the philosophy of Hobbes. Swift called him a successful humorist who failed as a serious writer.

EADIE, JOHN, D.D., LL.D., 1810–76; b. Scotland; educated at Glasgow university, and in 1835, ordained minister of the Cambridge street Secession church in Glasgow. In this position he took part in the union, in 1847, of his denomination with the Relief church, under the name of the United Presbyterian church. He became the leading representative of the latter denomination. Most of his written works were in connection with biblical criticism and interpretation. Among them were a *Biblical Cyclopædia;* an *Analytical Concordance; Early Oriental History; Life of Dr. Kitto;* and *History of the English Bible.*

EADMER OF CANTERBURY, a man of considerable mark in the beginning of the 12th c., would seem, from his name, to have been the child of English parents. At an early age, he entered the Benedictine monastery of Canterbury; and when St. Anselm, in 1093, was made archbishop of that see, Eadmer became one of his most devoted friends, sharing his exile, watching his death-bed, ordering his burial, and writing the chronicle of his life. Eadmer continued at Canterbury, in high esteem with St. Anselm's successor, archbishop Ralph, until 1120, when, at the request of king Alexander I., he went to Scotland, and was there chosen bishop of St. Andrews. The question of lay investiture of ecclesiastical benefices was then in its crisis; there was a controversy between Canterbury and York for jurisdiction over the see of St. Andrews; that see, again, asserted its independence of either of the English metropolitans; and Eadmer seems to have added to all these perplexities a difficulty as to his monastic allegiance. "Not for all Scotland," he said to the Scottish king, "will I renounce being a monk of Canterbury." The king, on his side, was equally unyielding; and the issue was the return of Eadmer to his English monastery, unconsecrated, indeed, but still claiming to be bishop of St. Andrews. He was made precentor of Canterbury, and died, it is supposed, in Jan., 1124. He tells us that, from his childhood, he was a diligent observer of contemporary events, especially in church affairs; and this habit has given more than usual interest to his writings. The most valuable are his *Historia Novorum,* or history of his own times, first printed by Selden in 1623, and his *Vita Anselmi,* or Life of St. Anselm, first published at Antwerp in 1551. Both these works are included in the selection of his writings published by the Benedictines of St. Maur (as a supplement to their edition of the works of St. Anselm), in 1 vol. fol. (Paris, 1721). His lives of St. Odo, St. Dunstan, and St. Bregwyn, of Canterbury, and of St. Wilfrid and St. Oswald, of York, were printed, some of them, by Wharton, in the second part of his *Anglia Sacra* (Lond. 1691), and others by Gerberon in his *Anselmi Opera* (Paris, 1675). The history of Eadmer, in relation to the bishopric of St. Andrews, is given at considerable length by lord Hailes, in his *Annals of Scotland,* vol. i. pp. 59–71; and, still better, in Mr. Grub's *Ecclesiastical History of Scotland,* vol. i. pp. 209–217 (Edin. 1861).

EADS, JAMES B., b. Ind., 1820; in early life engaged in navigation on the western rivers; went into the business of recovering sunken boats and cargoes, in which he made a fortune. When the rebellion began he offered plans for the defense of the western rivers, and undertook the construction of iron-clad gun-boats. In 1862, he built six iron-proof propellers, having two turrets each, in which he tried many of his own inventions. He is the constructor of the Illinois and St. Louis bridge, and of the important works for deepening the channel at the mouths of the Mississippi. See JETTY.

EAGLE (*aquila*), a genus of birds of prey, by some naturalists subdivided into several genera, constituting a group which contains the largest and most powerful of the *falconidæ*. From the most ancient times, the E. has been universally regarded as the emblem of might and courage; and, like the lion, it has been fancifully invested with other attributes of greatness, such as men thought to harmonize with these. Its extraordinary powers of vision, the vast height to which it soars in the sky, the wild grandeur of the scenery amidst which it chiefly loves to make its abode, and perhaps also its longevity, have concurred to recommend it to poetic regard. It was associated with Jupiter in the Roman mythology; its figure on the standards of the Roman legions expressed and animated their confidence of victory.

The eagles have the beak not curved from the very base, like the true falcons, nor notched on the edge, neither are their wings so long in proportion to their size. Their wings are, however, very broad and expansive; their legs are very robust; their claws curved, sharp, and strong. In the most restricted use of the generic term, the true eagles, of which the golden E. may be taken as a type, have a rather short bill, curved from the cere, with a slight festoon on the edge of the upper mandible, the tarsi are short, and feathered down to the toes. This last character distinguishes them at once from the ernes (q.v.), often also called eagles. There are several species of true eagles well ascertained, although in this as in allied genera much confusion has arisen from the diversity of plumage at different ages.—The GOLDEN E. (*A. chrysaëtos*)—of which what is called the ring-tailed E. is the young—is about 3 ft. or 3 ft. and a half in length, and 8 ft. in spread of wing. The female is rather larger than the male; the color is dark brown, in some parts almost black, the head and back of the neck in mature birds covered with pointed feathers of a golden-red color; young birds have a considerable part of the tail white. The golden E. is the largest of the European eagles, and is found not only throughout Europe, preferring wild and mountainous situations, but throughout almost the whole northern hemisphere: it is amongst the birds of India, of the n. of Africa, and of North America; and the savage warrior of the Rocky mountains, "as well as the Highland chieftain, glories in his E. plume." Although occasionally seen in all parts of Britain, it builds its nest only in mountainous districts, carrying a few sticks and brambles to the inaccessible shelf of a rocky precipice, where the eggs are deposited almost on the bare rock. The golden E. is now rare even in the Highlands of Scotland. A great quantity of prey is necessary to support a pair of these birds and their two or three young ones; and not only hares, game of every kind, and lambs are carried to the eyrie, but larger animals are sometimes attacked, and almost every district where eagles build their nests has its stories of children carried off to feed the eaglets, and often of their almost miraculous preservation.—The next in size to the golden E. among the eagles of Europe is the imperial or Grecian E. (*A. imperialis*), but it is more common in Egypt than in Europe, and has never been seen in Britain.—The spotted E. (*A. nævia*) has occurred in the s. of Ireland.—There is an Australian E. (*A. fucosus*).

Eagles were ranked among what were called, in the language of falconry, ignoble birds of prey, as incapable of being tamed and employed to assist in the sports of man. But either the golden E. or the imperial E. is used by the Tartars in the chase of antelopes, wolves, foxes, hares, etc.

The white-tailed E. or cinereous E. of Britain is the common erne (q.v.). The white-headed E. or bald-headed E. of America—the chosen emblematic E. of the United States—is also an erne. What particular species was the emblematic E. of the ancients, is not more certain than what is the original emblematic Scotch thistle.—Others of the E. group of *falconidæ* are known as marsh eagles, harpy eagles, eagle-hawks, ospreys, etc., some of which will be noticed in their places.

EAGLE, the king of birds, is used heraldically as an emblem of magnanimity and fortitude. It is variously represented, the best known mode being displayed (q.v.) or spread out, either with two heads—as in the arms of the Austrian empire, in which case it is popularly known as a spread eagle—or with one head, as in the arms of the German empire.

EAGLE, as a military standard, was adopted by the Romans, and even by nations preceding them in history. The Persians in the time of Cyrus the younger, bore an E. on a spear as a standard. The Romans for some time used the E., the wolf, the boar, the horse, and the minotaur for standards, but afterwards abandoned the last four, and confined themselves to the first. The Roman E., sometimes of gold, but more frequently of silver, was about as large as a pigeon with extended wings, and was borne on the top of a spear, with a cross-bar or a shield to support it. Some of the eagles were represented as holding thunderbolts in their talons, and usually bore the name of

the legion to which each respectively belonged. The E. was sometimes made of steel, but rarely.

In modern times France, Russia, Prussia, Austria, and the United States of America, have all adopted the E. as a national military symbol. The Austrian E. is represented double-headed.

EAGLE, a gold coin of the United States of America, of the value of ten dollars. See DOLLAR.

EAGLE, BLACK, ORDER OF THE, in Prussia, was founded by the elector of Brandenburg, on 17th Jan., 1701, the day of his coronation as king of Prussia. The number of knights, in addition to the princes of the royal family, was originally 30, but it is now unlimited. They must at their nomination be at least 30 years of age. They must prove their noble descent for four generations through both parents. A chapter is held twice a year.

The insignia of the order consist of an octagonal cross of blue enamel, and a black eagle, displayed between each of the arms of the cross. The cross is suspended by a broad ribbon of orange color across the left shoulder, and it is accompanied by an embroidered silver star, fastened on the left breast. The center of the star represents a black flying eagle, holding in one claw a laurel wreath, and in the other a thunderbolt, with the legend, *Suum cuique*. Fifty ducats must be paid by every new member for the support of the orphan asylum at Königsberg, and he then receives gratis the costume and insignia of the order, of which a full description will be found in Burke's *Orders of Knighthood*, p. 199. As the black eagle is the highest order in Prussia, no member of it, with the exception of foreign princes and knights of St. John, is permitted to wear any other order along with it; and as it is generally granted only to those who are expected to be about the person of the king, no one who holds it is permitted to travel from the court more than 20 German miles without giving notice. Knights of the black eagle are likewise knights of the red eagle (q.v.), first class.

EAGLE, RED, ORDER OF THE, in Prussia, founded in 1734 by the markgraf George Frederick Charles, as a reorganization of the "Ordre de la Sincérité," which had been instituted in the beginning of the century by the hereditary prince of Anspach and Baireuth. After passing through various modifications, the order of the red eagle was raised in 1791 by Frederick William II. to the rank of the second order in the monarchy, and it was then that the decoration of a white enameled Maltese cross, surmounted by a royal crown, with the Brandenburg eagle in the corner, was adopted. All the knights of the black eagle were received into this new order; and it was latterly decreed that only those who had been decorated with the red eagle, in the first instance, could be received into the black. In 1810, the order of the red eagle was reorganized, and two more classes were added to it. In 1830, the second class was subdivided into two, one of which only was allowed to wear a square star.

EAGLE HAWK, *Morphnus* or *Spizaëtus*, a genus or sub-genus of *falconidæ*, of the eagle group, but consisting of species of comparatively small size, and characterized by short wings, long slender legs (*tarsi*), and comparatively feeble toes and claws. Some of the species are extremely beautiful in form and colors. They are natives of warm climates, chiefly of South America, but also of Africa and the East Indies. The crested eagle (*M. cristatus*) of Guiana, and the Brazilian eagle, or urubitinga (*M. urubitinga*), may be mentioned as examples. The latter, although not so large as a goose, is sometimes called the Brazilian eagle.

EAGLE OWL, *Bubo*, a genus of the owl (q.v.) family (*strigidæ*), characterized by a somewhat incomplete facial disk, two tufts of feathers (*horns* or *egrets*) of considerable size on the head, ears with small openings (*conchs*), legs and toes covered with feathers, short strong curved bill, and long curved sharp claws. To this genus belong the largest of the nocturnal birds of prey. The E. O. of Europe (*B. maximus*) is little inferior in size to the golden eagle, and preys on quadrupeds such as hares, rabbits, and young deer, and on grouse, partridges, and other kinds of game. It seizes its prey with its feet, and seldom touches it with the bill till its struggles are over. It is an inhabitant of many parts of Europe and Asia, but it is only a rare occasional visitor in Britain. The loud peculiar cry of this bird, resounding strangely through the night, has obtained for it its German name of *uhu*, and an intimate association from time immemorial with evil omens and superstitious terrors.—The E. O. of America (*B. Virginianus*), the VIRGINIAN HORNED OWL or GREAT HORNED OWL, is very similar to the species just noticed, but of inferior size, although still a large and powerful, as it is also a bold bird. It does not scruple to attack half-grown turkeys, and often succeeds in making them its prey. It carries off with ease almost any other inhabitant of the poultry-yard. It is found in almost all parts of America.

EAGLE WOOD, an East India tree of which there are three varieties, containing much resin, and an oil which the natives esteem highly as a perfume or incense. Some of the trees are naturally inodorous, but after a disease which often attacks them the wood becomes colored and gives out a powerful scent. It is supposed to be a cure for gout, and in Europe is sometimes prescribed for rheumatic affections.

EA'GRE, another name for the bore (q.v.) in tidal rivers.

EAR, THE, ANATOMY AND PHYSIOLOGY OF. The apparatus of hearing, as it exists in man and the mammalia, is composed of three parts—the external ear, the middle ear or tympanum, and the internal ear or labyrinth.

The *external ear* consists of two portions, the *auricle* or *pinna* (the part popularly recognized as the ear), and the *auditory canal* or *external meatus*.

The auricle, on its outer or more exposed surface, presents various eminences and depressions, resulting from the form of its cartilaginous frame-work. These have received special anatomical names, to which it is unnecessary to advert further than to mention that the deep capacious central space to which several grooves converge, is termed the *concha*, and that the lowest and pendulous portion of the ear is termed the *lobe*. The cartilage forming the basin of the external ear consists of one principal piece, in which there are several fissures, which are filled up by fibrous membrane. Several muscles are described as passing from one part of the auricle to another, but they are so little developed in man that they do not require notice; there are additionally three muscles—the *attollens aurem* (or *superior auris*), the *attrahens aurem* (or *anterior auris*), and the *retrahens aurem* (or *posterior auris*), which pass from adjacent parts of the scalp to the E., and which, though more developed than the previous group, are of little or no real importance in man (at least in his civilized state), but are of considerable use in many mammals. Their actions are sufficiently indicated by their names.

The auditory canal passes from the concha inwards, and a little forwards, for rather more than an inch. It is narrower at the middle than at either extremity; and on this account there is often considerable difficulty in extracting foreign bodies that have been inserted into it. The membrane of the tympanum which terminates it is placed obliquely, in consequence of the lower surface of the meatus being longer than the upper. The canal is parly cartilaginous and partly osseous; the osseous portion consisting in the fœtus of a ring of bone, across which the membrane is stretched, and in many animals remaining persistently as a separate bone. The orifice of the meatus is concealed by a pointed process, which projects from the facial direction over it like a valve, and which is called the *tragus*, probably from being sometimes covered with bristly hair like that of a goat (*tragos*); and it is further defended by an abundance of ceruminous glands, which furnish an adhesive, yellow, and bitter secretion (see CERUMEN), which entangles small insects, particles of dust, and other small foreign bodies, and prevents their further passage into the meatus.

The *middle ear*, or *cavity of the tympanum*, is a space filled with air which is received from the pharynx (q.v.) through the Eustachian tube, and traversed by a chain of very small movable bones, which connect the membrane of the tympanum with the internal ear. It lies, as its name implies, between the external meatus and the labyrinth or internal E., and opens posteriorly into the cells contained in the mastoid portion of the temporal bone, which are also filled with air, and anteriorly into the Eustachian tube. The cavity is of an irregular shape, and is lined by a very delicate ciliated epithelium, which is a prolongation of that of the pharynx through the Eustachian tube.

Its external wall is mainly formed by the membrane of the tympanum, which is nearly oval, and placed in a direction slanting inwards, so as to form an angle of about 45° with the floor of the auditory canal. The handle of the malleus (or hammer), the first of the chain of ossicles, is firmly attached to the inner side of this membrane in a vertical direction as far downwards as the center, and by drawing it inwards, renders its external surface concave.

Its internal wall has two openings communicating with the internal E., each of which is closed by a delicate membrane. These openings are termed, from their respective shapes, the *fenestra ovalis*, and the *fenestra rotunda;* the former leads to the vestibule, and is connected by its membrane with the base of the stapes (or stirrup-bone), the last of the chain of ossicles; while the latter opens into the cochlea.

The ossicles of the tympanum are three—viz., the *malleus*, the *incus* (or anvil), and the *stapes*. We have already explained how the malleus is connected with the membrane of the tympanum by means of its handle. Through this connection, the tension of that membrane may be modified by the agency of one or two muscles which are attached to this ossicle. These muscles are the *laxator tympani*, which arises from the spinous process of the sphenoid bone (q.v.), and is inserted into the processus gracilis; and the *tensor tympani*, which arises from the under surface of the petrous portion of the temporal bone, and is inserted into the handle of the malleus immediately below the commencement of the *processus gracilis*. The existence of the former of these muscles is doubtful, many anatomists regarding the structure in question as ligamentous rather than muscular. The *incus* much more closely resembles a molar tooth with two fangs, than the anvil from which it derives its name. Of the two processes which it gives off, the short one runs backwards, and projects into the mastoid cells behind the tympanic cavity; while the long one inclines downwards, and terminates in the lenticular or orbicular process, to which the head of the stapes is attached. It has a head, neck, two branches, and a base, which, as has been already mentioned, fits into the fenestra ovalis. A minute muscle, the *stapedius*, takes its origin from a hollow conical eminence termed the *pyramid*, which lies behind the *fenestra ovalis*, and is inserted into the neck of the

stapes; by pulling the neck backwards, it probably compresses the contents of the vestibule.

The Eustachian tube, into which the tympanic cavity opens anteriorly, is about an inch and a half in length, and passes downwards, forwards, and inwards to its opening in the pharynx. It is partly bony, but chiefly cartilaginous. Its use is to allow the free passage of air in and out of the tympanum, and to admit of the egress of the mucus secreted in that cavity.

The *internal ear* or *labyrinth* is the essential part of the organ of hearing, being the portion to which the ultimate filaments of the auditory nerve (q.v.) are distributed. It is composed of three parts—viz., the *vestibule*, the *semicircular canals*, and the *cochlea*, which form a series of cavities presenting a very complicated arrangement, and lying imbedded in the hardest part of the petrous portion of the temporal bone. They communicate externally with the tympanum by the two openings already described—the *fenestra ovalis*, and the *fenestra rotunda;* and internally with the internal auditory canal, which conveys the auditory nerve from the cranial cavity to the internal ear. The very dense bone immediately bounding these cavities is termed the *osseous labyrinth*, to distinguish it from the *membranous labyrinth*, which lies within a portion of it.

The *vestibule* is a common central cavity into which the semicircular canals and the cochlea open. It is about a fifth of an inch in height, and in length from before backwards its transverse diameter (from side to side) being somewhat less. On its posterior wall are five orifices for the semicircular canals, one of the orifices being common to two of the canals. Anteriorly, the cochlea enters it by a single opening, the beginning of the *scala vestibuli*. On its outer wall is the fenestra ovalis, and on its inner are the *fovea hemispherica*, containing several minute orifices for the entrance of filaments of the auditory nerve, and the fovea semi-elliptica.

The *semicircular canals* are three in number, and open at both ends into the vestibule. They vary in length, and notwithstanding their name, each is considerably more than a semicircle, the superior vertical canal being the longest. Their average diameter is about a twentieth of an inch, the extremity of each canal exhibiting a dilatation or *ampulla*. Each canal lies in a different plane, very nearly at right angles to the planes of the other two, hence their names of the *superior vertical*, the *inferior vertical*, and the *horizontal* canals.

The *cochlea*, which derives its name from its resemblance to a common snail-shell, forms the anterior portion of the labyrinth. It consists of an osseous and gradually tapering canal, about an inch and a half in length, which makes two turns and a half spirally around a central axis, termed the *modiolus*, which is perforated at its base for the entrance of the filaments of the cochlear portion of the auditory nerve. This spiral canal gradually diminishes towards the apex of the cochlea. At its base, it presents two openings, one into the vestibule, and the other (closed by a membrane, and communicating with the tympanum) being the *fenestra rotunda* already described. Its interior is subdivided into two passages (*scalæ*) by an osseo-membranous lamina. This is the *lamina spiralis*, which divides the cochlea into an upper passage, the *scala vestibuli*, and a lower one, the *scala tympani*. At the apex, these two passages communicate by an opening to which the term *helicotrema* has been applied. Between the two scalæ, there is a third space termed the *ductus cochlearis*, or *scala intermedia*. In this space the filaments of the auditory nerve terminate, by being connected with a complicated arrangement of peculiarly formed epithelial cells, constituting the organ of corbi. For a notice of the membranous portion of the *lamina spiralis*, see AUDITORY NERVE.

We now return to the *membranous labyrinth*. The membranous and osseous labyrinths have the same shape, but the former is considerably smaller than the latter, a fluid, termed the *perilymph*, intervening in some quantity between them. At certain points, recent investigations have shown that the membranous is firmly adherent to the inner surface of the osseous labyrinth. The vestibular portion consists of two sacs, an upper and larger one, of an oval shape, termed the *utriculus*, or *common sinus*, and a lower and smaller one of a more globulous shape, called the *sacculus*.

The membranous semicircular canals resemble in form and arrangement the osseous canals which inclose them, but are only one third of the diameter of the latter. The ultimate filaments of the auditory nerve (q.v.) mainly go to the utriculus, to the sacculus, and to the ampulla of the canals.

The membranous labyrinth is filled by a fluid which is termed the *endolymph;* and in certain spots, especially at the terminations of the vestibular nerves, we observe, both in man and the lower animals, calcareous matter either in a powdered or solid form. In man and mammals generally, and in birds and reptiles, it occurs as a powder, and is termed *otoconia* or *ear-powder*, and it always consists of carbonate of lime.

We now proceed to consider the different functions or offices of the various parts of the organs of hearing.

1. *Of the External Ear.*—A true auricle only exists in the mammalia, and in this class it varies from little more than an irregularly-shaped cartilaginous disk, with little or no motion, as in man and the quadrumana, to an elongated funnel-shaped ear-trumpet, movable in all directions by numerous large muscles, as in the horse, the ass, and the bat.

The mode in which we see it employed by those animals in which it is highly

developed, sufficiently indicates that its main function is to collect and concentrate the sounds which fall upon it. But the experimental investigations of Savart, with an apparatus constructed to resemble the tympanic membrane and the external auditory apparatus, show that these parts are also adapted to enter into vibrations in unison with those of the air; and he suggested that the human auricle, by the various directions of different parts of its surface, could always present to the air a certain number of parts whose direction is at right angles with that of the molecular movement of that fluid, and therefore is the most favorable position for entering into vibrations with it.

2. *Of the Tympanum and its Contents.*—Savart's experiments show that the membrane of the tympanum is thrown into vibration by the air, and that it always executes vibrations equal in number to those of the sonorous body which excites the oscillations in the air. He further ascertained that the malleus participates in the oscillations of the tympanic membrane, and that these vibrations are propagated to the incus and stapes, and thus to the membrane of the fenestra ovalis. The malleus has further the office of regulating, through the *tensor tympani* muscle, the tension of the tympanic membrane; and to allow of the motion necessary for this purpose, we find. movable joints between it and the incus, and again between the latter bone and the stapes. The contraction of the stapedius muscle similarly modifies the tension of the membrane of the *fenestra ovalis;* and as compression exercised on this membrane extends to the perilymph, and is propagated through it to the *fenestra rotunda,* the tension of the membrane of the latter opening is also influenced by the muscle in question. The incus is much more limited in its motions than either of the other bones, and its use seems to be to complete the chain of ossicles in such a manner as to prevent any sudden or violent tension of the membranes, such as we can easily conceive might occur, if the conductor between the membranes were a single bone. The presence of air in the tympanic cavity serves a double purpose: in the first place, it preserves a uniform temperature on the outer surfaces of the fenestral membranes, and thus supports a fixed elasticity in them, which would not be the case if they were freely exposed to ordinary atmospheric changes; and secondly, the action of the chain of ossicles as conductors of sound is materially increased by their being completely surrounded by air, as is obvious from the first principles of acoustics.

3. *Of the Labyrinth.*—Sound is conducted to the labyrinth in three ways: first, by the chain of bones; secondly, by the air in the tympanic cavity; and thirdly, through the bones of the head.

Muller has shown, by very ingenious experiments on an apparatus constructed to resemble, on a large scale, the middle and internal E., that while the air in the tympanum conducts sound to the cochlea, through the *fenestra rotunda,* the chain of bones forms a much better conductor of it to the vestibule, through the *fenestra ovalis* (see the chapter on hearing in his *Physiology*). Hence, we infer that the vestibule is adapted to receive sounds from the membrane of the tympanum and the external E., while the cochlea, on the other hand, as its structure and connections indicate, may be regarded as that part of the labyrinth which is specially affected by sounds communicated through the bones of the head.

That the vestibule is the essential or fundamental part of the organ of hearing, is sufficiently proved by its constancy, other parts gradually disappearing as we descend the animal scale, and by its central position in the ears of the higher animals. The use of the otoconia or ear-powder is to strengthen the sonorous undulations, and to communicate to the membranous vestibule and ampullæ, and to their nerves, stronger impulses than the perilymph alone could impart. The action of otoliths or ear-stones, such as occur in osseous fishes, must be still more decided, and is well illustrated by the following experiment of Camper: Fill a bladder with water, and place a pebble in it. The slightest impulse communicated to the bladder disturbs the pebble, which consequently produces a greater impression on the hand supporting the bladder than the water alone could do.

Nothing certain is known regarding the functions of the semicircular canals, but their constant existence and number* in the vertebrated animals indicate their importance; and in most cases of congenital deafness they are more or less defective. The fact of their position corresponding with the three dimensions of a cube—namely, its length, breadth, and height—has led to the opinion that they are concerned in conveying a knowledge of the direction of sounds. This view is supported by prof. Wheatstone, who believes that we distinguish best the direction of those sounds which are sufficiently intense to affect the bones of the head, and that it is from the vibrations which are transmitted through these bones that our perception of direction is obtained. Thus, if the sound be transmitted in the plane of any one canal, the nervous matter in that canal will be more strongly acted on than in either of the other two; or if it be transmitted in a plane intermediate between the planes of this canal and the adjacent one, the relative intensity with which these two canals will be affected will depend upon, and indicate the direction of the intermediate plane.

The range of hearing, like that of vision, varies remarkably in different persons.

* The only exceptions that we can call to mind are those presented by the myxine or hag and the lamprey—the former has only one, the latter two, semicircular canals. Both are fishes of very low organization.

Some persons are insensible to sounds which others can readily hear. The ordinary range of human hearing comprised between the lowest notes of the organ and the highest known sound emitted by insects includes, according to Wollaston, more than nine octaves, the whole of which are distinctly perceptible by most ears. He relates, however, several cases in which the range, in reference to the perception of high notes, was much less. In one individual, the sense of hearing terminated at a note four octaves above the middle E of the pianoforte, the F above it being inaudible, although his hearing in other respects was as perfect as that of persons in general; another case was that of a lady who could never hear the chirping of the field-cricket; and in a third case the chirping of the common house-sparrow could not be heard. See his memoir on sounds inaudible by certain ears, *Phil. Trans.*, 1820.

The sensation of sound, like that of light, frequently lasts longer than the exciting cause. We have familiar proof of this fact in the noise which remains in the ears after a long journey in a coach or railway; and it was clearly demonstrated by Savart, who found, in his experiments on toothed wheels, that the removal of one tooth did not produce any interruption of the sound.

For diseases of the E., see DEAFNESS.

EAR, DISEASES OF THE. See DEAFNESS and OTITIS.

EAR, in music, is a figurative expression, meaning the possessing of a sensitive, just, and delicate appreciation of sound and measure.

EAR-COCKLES, PURPLES, or PEPPER-CORN, a disease in wheat, owing to the presence of *vibrio tritici*, one of the *infusoria*. This is an animal of worm-like form, yellowish-white, slender, tapering towards the tail, and more suddenly attenuated to a point at the head. Its minute eggs are supposed to be introduced into the sap of the wheat from infected seed, and so to find their way to the flowers, where they are hatched in the germen; the infected grains become dark green, then black, rounded like small pepper-corns, and furrowed on the surface; the glumes spread open, and the awns become twisted; the grains are filled with a white cottony substance, which at once dissolves in water, liberating the *vibrio* in great numbers. Henslow calculates that 50,000 of the young *vibrio* might exist in a grain of wheat. If the wheat is dried, the *vibrio* becomes dormant, but retains its vitality in this state for six or seven years, and is ready to revive on the application of moisture.

EARL (Ang.-Sax. *eorl*—a corruption of *ealdor*). The distinctive name of the noble amongst the northern races was *eorl*, or *jarl*, as opposed to the mere freeman, the *ceorl*, or *karl;* from which latter name come the modern German word *kerl*, and the Scotch word *carl*. From indicating the whole noble class, the title of eorl among the Anglo-Saxons, and perhaps generally among the Teutonic nations, came at first probably to be limited to those who were *ealdors*, or *ealdormen*, by office—that is to say, to those who were appointed to be at once governors and judges over a certain district, and to whom, according to Kemble (*Saxons in England*, ii. p. 126), the titles of *dux*, *princeps*, and *comes* are indiscriminately applied by the Latin writers, the same officer being sometimes called by the one title, and sometimes by the other. Being thus limited to those who held the office of ealdors, the social not unnaturally came to be confounded with the official title, and hence the general error of tracing the word earl not to *eorl*, a noble, but to *ealdorman*, a title which Mr. Kemble prefers to translate by duke. The early relation which subsisted between the duke and the count has been explained under the former title. In Europe generally, it was not till the count came to be recognized as a subordinate officer to the duke, governing a district of the province committed to the latter, that the earl assumed the position of the governor of a county, by the name of which he was commonly known. The title of duke, if it had ever existed, early disappeared in England, and was not revived till the time of Edward III. After the Norman conquest, the French term count was substituted for earl; but it held its place only for a very short time as the title of the officer, though it has continued ever since to give a name to the district over which he presided, and a title to his wife. William the conqueror, after the battle of Hastings, recompensed his chief captains by granting to them the lands and offices of the Saxon nobles; but by making the title of earl hereditary, he took, unintentionally perhaps, the first step towards changing it from a title of office to a title of dignity, and thus depriving it of substantial power. Deputies, *vice-comites*, or sheriffs, came necessarily to be appointed in all cases in which the earl was a minor, or otherwise incapacitated from discharging the duties of the office, till gradually the office itself passed to the deputy; the dignity alone, with the hereditary privilege of sitting as a legislator in the house of lords, remaining with the principal. The form of creation of an earl formerly was by the king girding on his sword, and placing his coronet on his head, and his mantle on his shoulders; but earls are now created by letters-patent; and it is not unusual for them to depart so far from the old notion of their being territorial officers, as to take as their titles their own names, with the prefix earl—e.g., earl Grey, earl Spencer, earl Russell, etc. At present, the number of earls, including the peerages of Scotland and Ireland, exceeds 200. See PEER.

The EARL'S CORONET is a circle of gold, rising at intervals into eight pyramidal points, or spikes, on the tops of which are placed as many pearls, and which alternate with strawberry-leaves. See CROWN.

EARLE, PLINY, 1762–1832; b. Mass.; inventor of machinery for making cards (for carding wool), by which he reduced the labor of hours to as many minutes. He was more than usually well informed in science and literature.

EARLE, PLINY, b. Mass., 1809; son of Pliny the inventor; educated at a Quaker school in Providence; licensed to practice as a physician in 1837; in 1840, was resident physician in the insane hospital at Frankford, Penn.; in 1844, physician to the Bloomingdale (N. Y.) insane asylum; after 1849, visited all the important insane asylums in Europe; in 1853, became physician to the New York lunatic asylum. Among his publications are: *Marathon and Other Poems; Visit to Thirteen Asylums for the Insane in Europe; History, Description, and Statistics of the Bloomingdale Asylum;* and many articles in the *American Journal of Insanity.*

EARLE, THOMAS, 1796–1849; b. Mass.; brother of Pliny the physician. When young he settled in Philadelphia, where he became a journalist and lawyer. He was active in the Pennsylvania constitutional convention in 1837, and is credited with having made the original copy of the new constitution. In 1840, the liberty party made him their candidate for vice-president, probably because he had broken away from the democratic party by advocating the extension of the right of suffrage to colored men. He published *Essay on the Penal Law; Essay on the Right of States to alter and annul their Charters; Treatise on Railroads and internal Communication; Life of Benjamin Lundy;* and a school spelling-book. At the time of his death he was about finishing a history of the French revolution. In early life he edited the *Columbian Observer; Standard; Pennsylvanian;* and *Mechanics' Free Press and Reform Advocate.*

EARL MARSHAL, an office of great antiquity, and formerly of importance. There seems reason to believe that the marshal of England, afterwards the E. M., was a distinct officer from the marshal of the king's house, but the point is not altogether clear, and there is, consequently, some difficulty in determining which of the offices was held by the Mareschals, earls of Pembroke. For many generations the office has been hereditary in the family of the dukes of Norfolk, though the earls marshal having, to an unusual extent, had the fate to die either childless or without heirs-male, the line of descent has been by no means a direct one. The last grant is by king Charles II., and bears date 19th Oct., 1672. The E. M. presided jointly with the constable over the court of chivalry (q.v.), the last proceedings of which are said to have taken place in 1631. He is the head of the college of arms (q.v.), which has jurisdiction in descents and pedigrees; determines all rival claims to arms; and he grants armorial bearings, through the medium of the kings-of-arms, to parties not possessed of hereditary arms. The office of the lyon in Scotland is generally supposed to correspond to that of the E. M. in England, but not quite correctly. The lyon having been subordinate to the marshal and constable of Scotland, his office was more nearly that of the kings-of-arms in England; with this difference, that it extended to the whole kingdom.

EARLOM, RICHARD, an engraver, whose works in mezzotinto, published during the end of last and beginning of this century, are well known as amongst the best of the period when that kind of engraving was practiced without the admixture of etching, adopted at the present time. His works after Reynolds, his plates from pictures in the Houghton gallery and the *Liber Veritatis,* consisting of imitations of the celebrated drawings by Claude, in the possession of the duke of Devonshire, are standard works in their various departments. He died in 1822, having some time previously retired from his profession.

EARL'S PENNY, an English corruption for Arles penny. See EARNEST.

EARLSTON, or ERCILDOUNE, a village in the s.w. of Berwickshire, on the Leader a n. branch of the Tweed, 30 m. w.s.w. of Berwick. Pop. '71, 1168. E. has been and still is famed for its manufacture of ginghams; it has also a factory for the manufacture of blankets, tweeds, etc. On the left bank of the Leader are the ruins of a building called "Rhymer's tower," as having been the residence of Thomas the Rhymer (q.v.), so famous in Scottish tradition. A mile s. of E. is Cowdenknowes, which is celebrated in song for its "bonny, bonny broom."

EARLY, a co. in s.w. Georgia, on the Alabama border, partially crossed by an extension of the Brunswick and Albany railroad; 500 sq.m.; pop. '70, 6,998—4,172 colored. The surface is level and the soil fertile, producing corn, cotton, etc. The Chattahoochee, on the w. border, is navigable for steamboats. Co. seat, Blakeley.

EARLY, JUBAL A., b. Va., 1818; graduated at West Point, 1837; served in the artillery in the Florida war. He resigned in 1838 to study law; became a member of the bar and of the Virginia legislature, and state attorney. In the war with Mexico he served as major and colonel. He was among the first to volunteer in the service of the rebellion, and at Bull Run was in command of a brigade. Two years later he was brig.gen., and had command of a division at Gettysburg. In 1864, he made a raid through the valley of the Shenandoah, invaded Pennsylvania, and partially burned Chambersburg. The tide of his success was turned by the union gen. Sheridan, who defeated him at Opequan, at Fisher's hill, and at Cedar creek. and he was routed by Custer at

Waynesborough. On account of these disasters he was dismissed from the confederate service. After a trip to Europe, he returned to Richmond, and resumed the practice of law.

EARLY ENGLISH, the term generally applied to the form of Gothic in which the pointed arch was first employed in this country. The early English succeeded the Norman towards the end of the 12th c., and merged into the decorated (q.v.) at the end of the 13th. Its characteristics are beautiful and peculiar. Retaining much of the strength and solidity of the earlier style, it exhibited the graceful forms, without the redundancy of ornament which latterly degenerated into a fault in that which followed. Generally, it may be said to bear to the decorated something like the relation which an expanding rosebud bears to a full-blown rose. The windows are long and narrow, and when gathered into a group, are frequently surmounted by a large arch, which springs from the extreme molding of the window on each side. The space between this arch and the tops of the windows is often pierced with circles, or with trefoils or quatrefoils, which constituted the earliest form of tracery. Each window, however, is generally destitute of any tracery in itself. "The moldings," says Parker, "in general consist of alternate rounds and deeply-cut hollows, with a small admixture of fillets, producing a strong effect of light and shadow."—*Gloss. of Architecture.* Circular windows, however, still continued to be used, and trifoliated archways over doors are also to be found, as at Salisbury cathedral. By far the most characteristic feature of the style is the tooth-ornament (q.v.), which is often used in great profusion. Where foliage is used, it is cut with great boldness, so as to throw deep shadows, and produce a very fine effect. The under-cutting is often so deep as to leave nothing to connect the leaves with the moldings but the stalks, and occasionally the edge or point of a leaf. The term E. E. is said, by Parker, to have been introduced by Mr. Millers in 1805. It corresponds to *Ogivale primitive* of French writers, and is very often known as the first pointed or lancet-arched amongst ourselves. See GOTHIC ARCHITECTURE.

EARN, a river and loch in the s. of Perthshire, in the finely-wooded, beautiful valley of Strathearn. Loch E. lies to the n. of Ben Voirlich; its eastern extremity is 24 m. w. of Perth. It is 7 m. long from e. to w., 1 m. broad, and 100 fathoms deep, and is surrounded by bold and rugged hills. The river E. flows e. from the loch 40 m. through the strath, past Comrie, Crieff, and bridge of E., into the estuary of the Tay, 7 m. s.e. of Perth. Along the river, near Abernethy, under a thick bed of clay, is a peat-bed 2 or 3 ft. thick, supposed to be a continuation of the submarine forest at Flisk.—The bridge of E., a much frequented village, stands on the right bank of the river, 6 m. s.s.w. of Perth, and near the saline springs of Pitcaithly.

EARNEST, or ARLES, as it is called in Scotland, from the civil law word *arrhæ*, is a small sum of money which is given, or a simple ceremony, such as shaking hands, which is performed in proof of the existence of that mutual consent which constitutes a contract. In the first case, the earnest is said to be pecuniary; in the second, symbolical. It is not the E., but the consent, i.e., the agreement to a certain price, that is the root of the bargain; and the E. thus becomes a mere adminicle of evidence, which may be dispensed with even in cases in which it is exacted by custom, if the parties choose to preserve other evidence of the completion of their bargain. The contracts in which E. has been most frequently given both in this country and elsewhere, are sale and service. In the case of sale, it usually consists of a small sum paid by the buyer, by the acceptance of which the seller is held to bind himself to the sale; in the case of service, it is a small sum given by the master, in accepting which the servant becomes bound to serve. The question as to whether the E. shall count as part of the price or wage depends on the intention of the parties, which, in the absence of direct evidence, will be inferred from the proportion which it bears to the whole sum. "If a shilling be given," as Mr. Erskine says, "in the purchase of a ship or of a box of diamonds, it is presumed to be given merely in evidence of the bargain, or, in the common way of speaking, is dead E.; but if the sum be more considerable, it is reckoned up in the price."—*Institutes*, b. iii. tit. iii. s. 5. The original view of E. in England was, that it was a payment of a small portion of the price or wage, in token of the conclusion of the contract (Story on *Sales*, p. 216); and as this view seems to have been adhered to, the sum, however small, would probably there be counted as a part payment. There is only one decision under the 17th section of the statute of frauds (29 Ch. II. c. 3), which provides that "no contract for the sale of any goods, wares, and merchandises, for the price of £10 sterling, or upwards, shall be allowed to be good, except the buyer shall accept part of the goods so sold; and actually receive the same, or give something in E. to bind the bargain, or in part payment." The case referred to "related to the purchase of a horse, where the purchaser produced a shilling from his pocket, and drew it across the hand of the seller's servant, and then returned it to his own pocket; and it was held that this act (which is a custom in the n of England, and is called striking a bargain) was not sufficient to satisfy the requisitions of the statute."—Story, *ut sup.* From this decision it follows that no importance is attached in England to such fictitious ceremonies as the Jew plucking off his shoe and giving it to his neighbor, the Indian smoking his pipe, or the less poetical observance of thumb-licking, which Erskine tells us was common among the lower classes in Scotland in his day.

EAR-RING. A ring suspended from the ear, which is bored for the purpose. This mode of adorning the person has always enjoyed great favor amongst orientals. By Persians, Babylonians, Lydians, Libyans, and Carthaginians, ear rings were worn by both sexes. In the classical nations of antiquity, their use was confined to women. In the *Iliad* (xiv. 182, 183), Juno is represented as adorning herself with ear-rings made with three drops resembling mulberries. From this period down to the latest, the practice prevailed in Greece, and we find the ears of the Venus de Medici pierced for the reception of ear-rings. Pliny says (xi. 50) that there was no part of dress on which greater expense was lavished amongst the Romans; and Seneca mentions an ear-ring which he says was worth a patrimony. It has four pearls, two above and two below the precious stone in the center. In the more valuable of the antique ear-rings, pearls were almost always used; and they were valued for the completeness of their form as well as for their whiteness. In place of a ring, the ornament was often attached to the ear with a hook, a custom which still prevails in Italy. Many Egyptian ear-rings of very beautiful design have been preserved. These antique designs have been imitated in modern times, and if the use of an ornament which seems fitter for a South sea islander than an English gentlewoman is to be continued, it can scarcely be made to assume a more graceful form than was often given to it by the ancients. See RING. During the reigns of Elizabeth and James I., ear-rings were worn in England by men; a custom which is still continued by many sailors. Master Matthew, in *Every Man in his Humor*, says to Brainworm: "I will pawn this jewel in my ear;" and Hall, in his *Satires* (B. vi. Sat. 1), speaks of the "ringed ear" of the new-come traveler; and many similar passages to the like effect might be quoted. At the present day in England, ear-rings are worn only by women. The ears are bored usually at about 7 years of age. The boring, which produces a temporary inflammation, acts as a counter-irritant in cases of sore eyes; and this is sometimes given as a reason for putting rings in the ears.

EARS, a term in organ-building, given to small projecting pieces of metal on the sides of the mouths of metal pipes, put on for the purpose of assisting the pipes to speak promptly, especially when the organ is of small scale. The German name of "beard" is fully more appropriate.

EAR SHELL, *Haliotis*, a marine mollusk, of which the shell is used for inlaying and other ornamental purposes, and for decorating walls. They resemble the human ear in shape; are from 6 to 8 in. long, and 5 or 6 wide; are found in all temperate and tropical seas, and in some countries are used for food, being obtained at low tide in deep water, where they are found adhering to the rocks. There are about 75 living species, and a few fossils have been found.

EARTH, THE, the globe on which we live, being the third planet in order form the sun, and the largest within the belt of the planetoids. We proceed to consider briefly the points of chief interest connected with it, and which do not fall to be treated under separate heads, viz., 1. Its form and magnitude; 2. Its mass and density; 3. Its motions; 4. Its temperature.

1. *The Form and Magnitude of the Earth.*—To a spectator so placed as to have an unobstructed view all round, it appears a circular plain, on whose circumference the vault of heaven seems to rest. Accordingly, in ancient times, even philosophers looked long upon the earth as a flat disk swimming upon the water. But many appearances were soon observed to be at variance with this idea, and even in antiquity, the spherical form of the E. began to be suspected by individuals. It is only by assuming the E. to be spherical, that we can explain how our circle of vision becomes wider as our position is more elevated; and how the tops of towers, mountains, masts of ships, and the like, come first into view as we approach them. There are many other proofs that the E. is a globe. Thus, as we advance from the poles towards the equator, new stars, formerly invisible, come gradually into view; the shadow of the E. upon the moon during an eclipse is always round; the same momentary appearance in the heavens is seen at different hours of the day in different places on the E.'s surface; and lastly, the E., since 1519, has been circumnavigated innumerable times. The objection to this view that readily arises from our unthinking impressions of up and down, which immediately suggest the picture of the inhabitants of the opposite side of the E,—our *antipodes*—with their heads downwards, is easily got over by considering that on all parts of the earth's surface *down* is towards the E.'s center.

It is not, however, strictly true that the E. is a sphere; it is slightly flattened or compressed at two opposite points—the poles—as has been proved by actual measurement of degrees of latitude, and by observations of the pendulum. It is found that a degree of a meridian is not everywhere of the same length (see DEGREE OF LATITUDE), as it would be if the E. were a perfect sphere, but increases from the equator to the poles; from which it is rightly inferred that the E. is flattened there. A pendulum, again, of a given length is found to move faster when carried towards the poles, and slower when carried towards the equator, which shows that the force of gravity is less at the equator than at the poles, or, in other words, that the center, the seat of gravity, is more distant at the former than at the latter. The diminished force of gravity at the equator has, it is true, another cause, namely, the centrifugal force arising from the rotation of the E., which acts counter to gravitation, and is necessarily greatest at

the equator, and gradually lessens as we move northwards or southwards, till at the poles it is nothing. But the diminution of the force of gravity at the equator arising from the centrifugal force amounts to only $\frac{1}{289}$ of the whole force; while the diminution indicated by the pendulum is $\frac{1}{194}$. The difference, or $\frac{1}{578}$ nearly, remains assignable to the greater distance of the surface from the center at the equator than at the poles. From the most accurate measurements of degrees that have been made, the flattening or ellipticity of the E. has been determined by Bessel at $\frac{1}{299 \cdot 153}$, or $\frac{1}{300}$ nearly; or, the equatorial radius is to the polar as 300 to 299. These measurements of degrees determine not only the shape but the size of the earth. Bessel's calculations give a geographical mile, or the 60th part of a mean degree of the meridian, at 951.807 toises (2,029 yards, thus making the whole circumference 43,526,400 yards), and the equatorial and polar diameters at 6,875.6 and 6,8552.4 geographical m. (7,925.6 and 7,899.14 English imperial miles). The surface of the E. contains nearly 150 millions of square geographical miles.

2. *The Mass and Density of the Earth.*—We have now seen that the E. is a sphere slightly flattened at its poles—what is called by geometers an elliptical spheroid—of a mean radius of somewhat less than 4,000 miles. We have next to consider its mass and density. Nothing astonishes the young student more than the idea of weighing the E.; but there are several ways of doing it; and unless we could do it, we never could know its density. (1.) The first method is by observing how much the attraction of a mountain deflects a plummet from the vertical line. This being observed, if we can ascertain the actual weight of the mountain, we can calculate that of the earth. In this way, Dr. Maskelyne, in the years 1774–76, by experiments at Schihallion, in Perthshire, a large mountain mass lying e. and w., and steep on both sides—calculated the E.'s mean density to be five times greater than that of water. The observed deflection of the plummet in these experiments was between 4″ and 5″. (2.) In the method just described, there must always be uncertainty, however accurate the observations, in regard to the mass or weight of the mountain. The method known as *Cavendish's experiment* is much freer from liability to error. This experiment was first made by Henry Cavendish on the suggestion of Michel, and has since been repeated by Reich of Freyberg, and Mr. Francis Baily. In the apparatus used by Mr. Baily two small balls at the extremities of a fine rod are suspended by a wire, and their position carefully observed by the aid of a telescope. Large balls of lead placed on a turning-frame, the center of which is in the prolongation of the suspending wire, are then brought near them in such a way that they can affect them only by the force of their attraction. On the large balls being so placed, the small ones move towards them through a small space, which is carefully measured. The position of the large balls is then reversed—i.e., they are placed at the same angular distance on the other side of the small balls—and the change of position of the small balls is again observed. Many observations are made, till the exact amount of the deviation of the small balls is ascertained beyond doubt. Then by calculation the amount of attraction of the large balls to produce this deviation is easily obtained. Having reached this, the next question is, what would their attraction be if they were as large as the earth? This is easily answered, and hence, as we know the attractive force of the E., we can at once compare its mean density with that of lead. Mr. Baily's experiments lead to the result that the E.'s mean density is 5.67 times that of water. (3.) A third mode has lately been adopted by the astronomer-royal, by comparison of two invariable pendulums, one at the E.'s surface, the other at the bottom of a pit at Harton colliery, near Newcastle, 1260 ft. below the surface. The density of the E., as ascertained from this experiment, is 6 and 7 times that of water; but for various reasons this result is not to be accepted as against that of the Cavendish experiment, and it is said that the astronomer-royal was himself dissatified with it, and meant to repeat the experiment with new precautions. The density of the E. being known, its mass is easily calculated, and made a unit of mass for measuring that of the other bodies in the system. It is found that the mass of the E. compared with that of the sun is .0000028173.

3. *The Motions of the Earth.*—The E., as a member of the solar system, moves along with the other planets round the sun from w. to east. This is contrary to our sensible impressions, according to which the sun seems to move round the E.; it was not till a few centuries ago that men were able to get over this illusion. See COPERNICAN SYSTEM. This journey round the sun is performed in about 365¼ days, which we call a year (solar year). The E.'s path or orbit is not strictly a circle, but an ellipse of small eccentricity, in one of the foci of which is the sun. It follows that the E. is not equally distant from the sun at all times of the year; it is nearest, or in perihelion, at the beginning of the year, or when the northern hemisphere has winter; and at its greatest distane, or aphelion, about the middle of the year, or during the summer of the northern hemisphere. The difference of distance, however, is comparatively too small to exercise any perceptible influence on the heat derived from the sun, and the variation of the seasons has a quite different cause. The least distance of the sun from the E. is over 94 millions of miles, and the greatest over 96 millions; the mean distance is commonly stated at 95 millions of miles. If the mean distance be taken as unity, then the greatest and least are respectively represented by 1.01679, and 0.98321. It follows that the E. yearly describes a path of upwards of 596 millions of miles, so that its velocity in its orbit is about 99,000 ft., or 19 m. in a second.

Besides its annual motion round the sun, the E. has a daily motion or rotation on its axis, or shorter diameter, which is performed from w. to e., and occupies exactly 23 hours, 56 minutes, 4 seconds of mean time. On this motion depend the rising and setting of the sun, or the vicissitudes of day and night. The relative lengths of day and night depend upon the angle formed by the E.'s axis with the plane of its orbit. If the axes were perpendicular to the plane of the orbit, day and night would be equal during the whole year over all the E., and there would be no change of seasons; but the axis makes with the orbit an angle of 23½°, and the consequence of this is all that variety of seasons and of climates that we find on the E.'s surface; for it is only for a small strip (theoretically, for a mere line) lying under the equator that the days and nights are equal all the year; at all other places, this equality only occurs on the two days in each year when the sun seems to pass through the celestial equator, i.e., about the 21st of Mar., and the 23d of September. From Mar. 21, the sun departs from the equator towards the n., till, about June 21, he has reached a n. declination of 23½°, when he again approaches the equator, which he reaches about Sept. 23. He then advances southward, and about Dec. 21, has reached a s. declination of 23½°, when he turns once more towards the equator, at which he arrives, Mar. 21. The 21st of June is the longest day in the northern hemisphere, and the shortest in the southern; with the 21st of Dec., it is the reverse.

The velocity of the E.'s rotation on its axis evidently increases gradually from the poles to the equator, where it is about equal to that of a musket-ball, being at the rate of 24,840 m. a day, or about 1440 ft. in a second.

A direct proof of the rotation of the E. is furnished by its compression at the poles. There are indubitable indications that the E. was originally fluid, or at least soft; and in that condition it must have assumed the spherical shape. The only cause, then, that can be assigned for the fact that it has not done so, is its rotation on its axis. Calculation also shows that the amount of compression which the E. actually has, corresponds exactly to what its known velocity and mass must have produced. Experiments with the pendulum, too, show a decrease of the force of gravity from the poles towards the equator; and though a part of this decrease is owing to the want of perfect sphericity, the greatest part arises from the centrifugal force caused by the motion of rotation. Another direct proof of the same hypothesis may be drawn from the observation that bodies dropped from a considerable height deviate towards the e. from the vertical line. This fact has been established by the experiments of Benzenberg and others. In former times, it was believed that if the E. actually revolved in the direction of e., a stone dropped from the top of a tower would fall, not exactly at the foot of the tower, but to the w. of it. Now, as experience, it was argued, shows that this is not the case—that the stone, in fact, does fall at the bottom—we have here a proof that the pretended rotation of the E. does not take place. Even Tycho Brahé and Riccioli held this objection to the doctrine to be unanswerable. But the facts of the case were just the reverse. Newton, with his wonted clearness of vision, saw that, in consequence of the E.'s motion from w. to e., bodies descending from a height must decline from the perpendicular, not westward, but eastward; since, by their greater distance from the E.'s center, they acquire at the top a greater eastward velocity than the surface of the E. has at the bottom, and retain that velocity during their descent. He therefore proposed that more exact observations should be made to ascertain the fact; but it was not till more than a century afterwards that experiments of sufficient delicacy were made to bring out the expected result satisfactorily. It is difficult to find an elevation sufficiently great for the purpose, as several hundred feet give merely a slight deviation, which it requires great accuracy to observe. If a height of 10,000 ft. could be made available, the deviation would be not less than 7½ feet. The analogy of our E. to the other planets may also be adduced, the rotation of which, with the exception of the smallest and the most distant, is distinctly discernible. Finally, an additional proof of the E.'s rotation was lately given by Léon Foucault's striking experiment with the pendulum. The principle of the experiment is this: that a pendulum once set in motion, and swinging freely, continues to swing in the same plane, while at any place at a distance from the equator the plane of the meridian continues to change its position relative to this fixed plane.—The objection taken to the doctrine of rotation from the fact that we are unconscious of any motion, has little weight. The movement of a vessel in smooth water is not felt, though far less uniform than that of the E.; and as the atmosphere accompanies the E. in its motion, there is no feeling of cutting through it to break the illusion of rest.

If the turning of the E. on its axis is thus proved to be the cause of the apparent daily motion of the heavens, it is an easy step to consider the annual motion of the sun through the constellations of the zodiac as also apparent, and arising from a revolution of the E. about the sun in the same direction of w. to east. If we consider that the mass of the sun is about 359,000 times greater than that of the E., and that by the laws of mechanics, two bodies that revolve round each other, must revolve about their common center of gravity, the idea of the sun revolving about the E. is seen to be simply impossible. The common center of gravity of the two bodies being distant from the center of each inversely as their respective masses, is calculated to be only 267 m. from the center of the sun, and therefore far within his body, which has a diameter of

882,000 miles. But by help of a figure, it is easy to show that the apparent motion of the sun on the ecliptic naturally arises from a motion of the E. about the sun. The motions of the planets also, that appear so complicated and irregular as seen by us, can only be satisfactorily explained by assuming that they too revolve round the sun in the same direction as the earth. See PRECESSION and NUTATION for an account of a small periodic motion of the E.'s axis and its effects.

4. *The Earth's Temperature.* See METEOROLOGY and TEMPERATURE as to the phenomena of heat on the E.'s surface. As we go below the surface, we reach a depth beyond which the interior of the E. seems to have no sympathy with the external causes of heat or cold, and its heat appears to be its own, and to increase according to a fixed law the deeper we descend. The average rate of observed increase is 1° F. for a descent of between 40 and 50 feet. If this law were universal—which we do not know it to be—at a depth of less than 30 miles the heat would be such as to hold in fusion all known substances, and the E. would have to be regarded as a very thin crust or shell full of molten liquid. This theory of a molten interior obtained at one time extensive currency among philosophers, being indorsed with the names of Fourier and Humboldt; but it has since been shown to be inconsistent with the rigidity which astronomical observations prove the E. to possess. A liquid nucleus would be subject to tides like the ocean, and the crust would partake of the motion. Granting the increase of heat to be constant, we do not know what effect the increasing pressure may have in preventing fusion.

EARTH-CLOSET. See SEWAGE EARTH-CLOSET, *ante.*

EARTHENWARE. See POTTERY.

EARTH-HOUSES, EIRD-HOUSES, or YIRD-HOUSES, the name which seems to have been generally given throughout Scotland to the under-ground buildings which in some places are called also "Picts' houses" (q.v.), and in others, it would appear "weems," or caves. Martin, in his *Description of the Western Islands,* printed in 1703, when their use would appear to have been still remembered, speaks of them as "little stone-houses built under ground, called earth-houses, which served to hide a few people and their goods in time of war." The earth-house, in its simplest form, is a single, irregularly shaped chamber, from 4 to 10 ft. in width, from 20 to 60 ft. in length, and from 4 to 7 ft. in height, built of unhewn and uncemented stones, roofed by unhewn flags, and entered from near the top by a rude doorway, so low and narrow that only one man can slide down through it at a time. When the chamber is unusually wide, the side-walls converge, one stone overlapping another, until the space at the top can be spanned by stones of 4 or 5 ft. in length. In its more advanced form, the earth-house shows two or more chambers, communicating with one another by a narrow passage. There are instances in which one of the chambers has the circular shape and dome-roof to which archæologists have given the name of the "Beehive-house" (q.v.). Occasionally, as many as forty or fifty earth-houses are found in the same spot, as in the moor of Clova, not far from Kildrummy, in Aberdeenshire. They appear to have been almost invariably built in dry places, such as gravelly knolls, steep banks of rivers, and hill-sides. They are generally so near the surface of the ground that the plow strikes upon the flagstones of the roof, and thus leads to their discovery. The object most frequently found in them is a stone quern, or hand-mill, not differing from that which continued to be used in remote corners of Scotland within the memory of living men. Along with the quern are generally found ashes, bones, and deer's horns; and more rarely small round plates of stone or slate, earthen vessels, cups and implements of bone, stone celts, bronze swords, gold rings, and the like. Occasionally the surface of the ground beside the earth-house shows vestiges of what are supposed to have been rude dwelling-houses, and folds or inclosures for cattle. This, with other things, would indicate that the earth-houses of Scotland and Ireland (for they are found also in that island) were put to the same purpose as the caves which, as Tacitus (writing in the 2d c.) tells us, the Germans of his day dug in the earth, as storehouses for their corn, and as places of retreat for themselves during winter or in time of war.

EARTH-NUT, a popular name for the tubers of certain umbelliferous plants, particularly *bunium bulbocastanum* and *B. flexuosum,* which are common in most parts of Europe. Names of the same signification are given to them in a number of European languages. *Arnut, yernut,* and *jurnut,* Scotch and English provincial names, are corruptions of earth-nut. PIG-NUT is another common English name, pigs being very fond of these tubers, grubbing up the ground in quest of them, and soon becoming fat upon them. They are also called *earth-chestnut,* from their resemblance in taste and qualities to chestnuts, perhaps also from their resemblance in size, and their being black or very dark brown externally, and white within. By some they are preferred to chestnuts, and they are much used for food in different parts of Europe, and occasionally in some parts of England, either roasted or in soups. They are wholesome and nutritious; they form an article of trade in Sweden, and have sometimes been recommended as worthy of an attention which they have never yet received in Britain. The two species are very similar in general appearance, although *B. bulbocastanum* has by some botanists been referred to the genus *carum* (caraway), because its carpels have single vittæ between the ribs, whilst *B. flexuosum* has three. The former is also a plant of stouter habit.

Both have umbels of small white flowers, much divided leaves with very narrow segments, and a single roundish tuber at the foot of each plant. *B. flexuosum* is common in woods, pastures, waysides, etc., in most parts of Britain. *B. bulbocastanum* is found only in some of the chalk districts of England, but is abundant in many parts of Europe. *B. ferulaceum* likewise affords tubers, which are used as food in Greece.—The somewhat similar tubers of another umbelliferous plant, *oenanthe pimpinelloides*, which grows in the pastures of some parts of the s. of England, are sometimes also used for food, notwithstanding the very poisonous qualities of some of its congeners. See WATER-DROPWORT.—A Himalayan umbelliferous plant (*chærophyllum tuberosum*), a species of chervil (q.v.), yields edible tubers or *earth-nuts*.—The name earth-nut is sometimes extended to other small tuberous roots of similar quality, although produced by plants widely remote in the botanical system, as *apios tuberosa* and *lathyrus tuberosus*. See APIOS and LATHYRUS.

EARTHQUAKE, the term applied to any tremor or shaking of the solid crust of the earth. The frequent occurrence of earthquakes, their destruction to life and property, their influence upon the solid surface of the earth, and the mysteriousness of their cause, force them upon our attention. It is estimated that 12 or 13 earthquakes, destructive more or less of life and property, occur every year, and it is well known that the surface of the globe is never free from sensible evidence of the continued operation of E. agency—that in some quarter or another tremors or slight shakings are always taking place. When these are of a serious nature, whole cities have been destroyed; fertile districts, with all their fruits and grain, have been laid waste; and enormous masses of human beings have lost their lives. No less than 60,000 perished in the great Lisbon E.; while in that of Calabria, in the end of last century, 40,000 were destroyed. It is estimated that as many as 13,000,000 of the human race have thus perished! The great changes which earthquakes produce on the earth's surface deserve the careful attention of the geologist. They disclose to him an agency which seems to have been at work during every period of the earth's history, and which has altered the earth's surface to an extent that can scarcely be imagined. The observed results of earthquakes which more immediately demand his attention are such as these: the new lakes and river-courses which they form, at the same time obliterating the old ones; the new valleys which they hollow out; the fissures of various sizes they form; and the immense landslips they frequently produce. But the mysterious nature of the producing cause of earthquakes is also a strong incentive to their study. It is unfortunately true, that the most popular scientific inquiries are those in which the imagination has large play: dry inductions from observed phenomena are not suited to the genius of popular modern science. Consequently, earthquakes, where every attempt at explaining their origin is theoretical, from the impossibility of obtaining direct observation, affording as they do a wide field for the play of the poetic faculty, find plenty of students.

No portion of the earth's surface is exempt from the influence of earthquakes. Egypt has been less visited than perhaps any other country, but even here we have the record of one which took place in 1740 A.D.; and Holland, with its loose alluvial deposits, has also felt their power. Nor is the bed of the ocean exempt; records of many subaqueous earthquakes exist, taken by vessels at sea, sometimes passing over the point of greatest disturbance at the moment of the shock. In like manner earthquakes have been active at every period of the earth's existence, breaking up its solid crust, elevating or depressing its surface, and doing as much as any other single agent to bring it into its present condition. They have been probably at some periods more active than at others, just as we find that some districts are now more liable than others to their visitation. So well defined, indeed, are the localities where earthquakes occur, that it is easy to exhibit their limits on a map. They are most frequent around the present lines or centers of volcanic action (see VOLCANO); and their frequency and violence seem to bear some relation to the activity and intensity of the associated volcanoes. Observers of volcanic phenomena have noticed that every great eruption, in whatever part of the world observed, and whether from a volcanic vent on land or beneath the ocean, is accompanied by E. shocks of greater or less violence and duration; while, on the other hand, those observing eaathquakes speak of them as accompanied by volcanic eruptions, and of their often being stopped on the opening of volcanic vents. It is, however, an important fact that, although regions of active volcanic action are those of most frequent E. movements, yet the most violent earthquakes do not appear to have occurred in these regions, but, on the contrary, in districts lying some degrees away from the nearest volcanic action, as, for instance, in the famous E. of Lisbon. Districts in which there are extinct volcanoes are not more liable to such visitations than non-volcanic regions.

The phenomena connected with earthquakes have been variously described. Many writers refer to appearances in the heavens, or changes in the atmosphere, which to them seem to have some connection with the catastrophes they narrate. They tell of irregularities in the season preceding or following the shock, of sudden gusts of wind interrupted by sudden calms, of violent rains at unusual seasons, or in countries where such phenomena are almost unknown, of a reddening of the sun's disk, of a haziness

in the air often continued for months, and similar phenomena. But these are so irregular in their appearance, and have been so seldom observed associated with more than a single E., that, in the absence of any decided reason to the contrary, there seem good grounds for believing they have no real connection with the earthquake. It is different with underground noises, which frequently precede, accompany, or succeed the occurrence of earthquakes, or some of the shocks of them. They are undoubtedly intimately connected with the shock, yet earthquakes occur, even of the greatest violence, which are unaccompanied by any sound whatever. Different descriptions have been given of these subterranean noises. In some earthquakes, they are likened to chains pulled about, increasing to thunder; in others, the sound is like the rumbling of carriages, growing gradually louder, until it equals the loudest artillery; or like heavy wagons running away upon a road; or distant thunder; or like the hissing produced by the quenching of masses of red-hot iron in water; or like the rush of wind underground. As there have been earthquakes without subterranean noises, so there are frequently, in South America and elsewhere, underground sounds which are not followed by earthquakes.

The more intimate earthquake-phenomena are more uniform. Sometimes there is nothing else felt than a trembling or gentle motion of the surface, without producing any injury. In severe earthquakes, the almost invariable succession of phenomena is first a trembling, then a severe shock, or a succession of shocks, and then a trembling, gradually becoming insensible. The violent shocks are instantaneous, and very few in number, sometimes only one, usually not more than three or four. In the intervals between these, smaller shocks or tremblings take place. The severe shocks do the mischief. At the point or line of greatest disturbance, the shock has a distinctly vertical direction, coming from below upwards. As we leave this point, the direction of the motion becomes more and more horizontal, gradually also decreasing in intensity until it becomes insensible. This progressive movement is produced by an earth-wave or true undulation of the solid crust of the earth. The whole mass of the area is not moved at once, but only the wave-crest. In the case of the earthquake at Lisbon, the progress of the wave was roughly calculated; it was shown to have had a very great velocity, and to have lasted only for an instant at any one spot. The area affected on this occasion was very extensive. The shock was felt on the one side as far as the southern shores of Finland, and on the other it reached beyond the St. Lawrence in Canada, and was observed in some of the West India islands—an area of no less than 7,500,000 sq. miles. The force required to move this must have been enormous, for, suppose the thickness of the earth's crust moved to have been no more than 20 m., then 150,000,000 cubic m. of solid matter was moved. The influence of this earth-wave is communicated to the sea, when the E. is near the shore, or on the bed of the ocean. The sea swells, and slightly retires from the beach, and then a great wave rolls in upon the shore. At the Lisbon E., this wave rose to a height of 60 ft. at Cadiz. It carries with it sea-spoil, scattering it over the surface of the earth, far beyond the ordinary reach of the sea.

Of the various theories as to the nature of earthquakes, we can only refer to the most important. All theorists are agreed as to the connection between volcanoes and earthquakes; that they are produced by the same subterranean agency. The existence of molten matter in the interior of the earth, is the starting-point in all except the chemical theory propounded by Davy, which, though in the end abandoned by him, still finds supporters. When he discovered the metallic bases of the earths and alkalies, he threw out the idea that those metals might abound in an unoxidized state in the subterranean regions, to which water must occasionally penetrate. When this occurred, gaseous matter would be set free, sufficient to produce the E., the metals would combine with the oxygen of the water, and heat enough would be evolved to melt the surrounding rocks.

Mr. Mallet, in an elaborate report on the subject presented to the British association, proposed an ingenious theory. He assumes that volcanoes, and the centers of E. disturbances, are near the sea, or other large supplies of water; and he says that when an irruption of igneous matter takes place beneath the sea-bottom, the first action must be to open up large fissures in its rocky material, or to lift and remove its incoherent portions, such as sand, mud, gravel, etc. The water on meeting the heated surfaces assumes the spheroidal state; while in this condition, the intestine motion may be great, but little steam is generated; but no sooner have the surfaces cooled, than the water comes into close contact with them, and a vast volume of steam is evolved explosively, and blown off into the deep and cold water of the sea, where it is condensed, and thus a blow of the most tremendous sort is given at the volcanic focus, and being transferred outwardly in all directions, is transmitted as the E. shock. The surfaces of the ignited material, however, now cooled down below the point at which steam can be generated rapidly, merely keep up a gentle ebullition, which is transmitted as the trembling after the shock. On the surfaces again becoming heated by conduction from the molten mass, the various phases are again repeated. This he considers the chief cause of earthquakes, but he supposes they may also be due to the evolution of steam through fissures, and its irregular and *per saltum* condensation under pressure of sea-water; or to great fractures and dislocations in the rocky crust, suddenly produced by pressure acting on it from beneath, or in any other direction.

The old assumption that the earth consists of a molten fluid core with a cooled and hardened rind floating upon it, is inconsistent with the rigidity that astronomers have proved the earth to possess. But although the earth must be mainly solid, it is yet believed to be of a honey-combed structure, and that the cavities contain in many places lakes of molten rock, between which and the surface volcanoes are orifices of communication. Into these cavities, water sinking down through crevices from the ocean or the land must be constantly finding its way; and the steam thus generated exerts such enormous pressure as to force the molten matter to the surface, itself mingling and escaping along with it. When a mass of water is suddenly precipitated into a hot cavern, the explosion of steam will cause an earthquake concussion, and where there is no vent, may be sufficient to convulse and rend the superincumbent strata.

EARTHS, in chemistry, are a class of substances regarded by the alchemists and older chemists as elementary, and which are insoluble in water. The earths *proper* are now known to be compound, consisting of a metal in combination with oxygen. The list includes alumina, glucina, zirconia, thoria, didymia, lantana, ceria, yttria, terbia, erbia. They do not alter vegetable colors, are soluble in acids, and are precipitated from their solutions by ammonia, potash, or soda. The *Alkaline Earths* have already been noticed. See ALKALIES.

EARTH-SHINE, the reflection from the moon of the light cast upon her by the earth, particularly noticeable in clear nights at the time of new moon, when sometimes the whole surface of the moon can be seen in ashy colored light. The earth serves the same purpose to the moon that the moon does to the earth; that is, the earth is the moon's moon, and would present to an observer on the moon the same phases that the moon does to us; but the earth would, to an observer from the moon, appear four times as large as the moon does to us. When it is new moon to us, it is full moon to an observer on the side of the moon facing the earth, and, as the earth is much the larger, it gives to the moon about 16 times as much light as the full moon gives to us. This light, reflected back to us, is known as earth-shine. It is really the light of the sun reflected by the earth to the moon, and by the moon back to the earth.

EARTHWORKS, in fortification, is a general name for all military constructions, whether for attack or defense, in which the material employed is chiefly earth. The word *earthwork*, however, has lately received a new importance, in reference to a discussion among military engineers, whether earthwork defenses generally are better or worse than those of masonry. The subject cannot be discussed here, but its general character may be indicated. The fracture of the Russian granite fortifications at Bomarsund, and the obstinate defense made within the earthen defenses at Sebastopol, led many writers, about the year 1855, to express a preference for earthworks instead of stoneworks. Mr. J. Fergusson (*Portsmouth Protected*, 1856) has especially distinguished himself by his advocacy of this view. The reasons urged are—that masses of earth can be more quickly and cheaply put up than masses of masonry; that in most places earth is more readily obtained than stone; that if an earthwork be knocked to ruin by balls and shells, it can be repaired in a very short time; and that the defenders are not exposed to so much injury as in masonry-works, where splinters of stone fly about in a perilous way. The late sir John Burgoyne, the leading military engineer in England of his day, combated these views. He contended, among other things, that as a given amount of cannonading will make a much larger breach in earthwork than in stonework, the latter is best fitted to prevent capture by assault. He insisted that earthworks should be regarded rather as temporary expedients than as purposed and permanent constructions; and he claimed the authority of continental engineers in support of this opinion. See further under FORTIFICATION.

EARTHWORM, *Lumbricus*, a genus of *annelida* (q.v.), of the order *terricolæ*. There are many species, all of them pretty closely resembling in characters and habits the common E. or dew-worm (*L. terrestris*), which is everywhere plentiful in Britain and throughout Europe, and is familiar to everybody. It has no head distinct from the body, no eyes, no antennæ, nor any organs external to the rings of which its body is composed, except minute bristles pointing backwards, of which each ring bears four pair, and which are of use in its locomotion. It sometimes attains to nearly a foot in length, and more than 120 rings have been counted in its body. The end at which the mouth is situated is pointed, and the tail is flattened, whilst the general form is cylindrical. The mouth consists merely of two lips, the upper lip elongated; there are no teeth nor tentacles, and the worm subsists by swallowing fine particles of the soil, from which its digestive organs extract the digestible matter, the rest being voided often in little intestine shaped heaps, called *worm-casts*, on the surface of the ground. The locomotion of the E. is effected by means of two sets of muscles, which enable it to contract and dilate its rings; its bristles preventing motion backwards, and the whole muscular effort thus resulting in progress; whilst the expansion of the rings, as it contracts the anterior segments, and draws forward the hinder parts, widens a passage for it through earth whose particles were close together before. Earthworms are thus of very great use, their multitudes continually stirring and loosening the soil through which they work their way; and moles, pursuing them to feed on them, stir and loosen it still more; whilst worm-casts gradually accumulate on the surface to form a layer of the

very finest soil, to which it is supposed that the best old pastures in a great measure owe their high value.

Earthworms do not often visit the surface of the ground, except during night, and when the ground is moist. In the evening, during or after rain, or in the morning, when the dew is abundant, they may sometimes be seen traveling about in great numbers. Both drought and cold cause them to retreat more deeply into the earth.—Their respiration is effected by means of little sacs, which communicate by minute pores with the external air. They are hermaphrodite, but mutual fecundation takes place by means of the thickened knot (*clitellum*) which is situated before the middle of their body. Their eggs often contain two embryos, and the young worms escape by a sort of valvular opening at the end.

Besides their usefulness in the improvement of the soil, earthworms are of importance as food for birds, fishes, etc. Their value as bait for fishes is well known to every angler. The instinct which prompts them to hasten to the surface, when, in quest of bait, the angler shakes the soil with a spade or fork, is probably to be referred to the similar shaking on the approach of their constant enemy, the mole.

An E. of great size is common in the East Indies, wherever the climate is moist, from the Himalaya to Ceylon and Java. It is *ichthyophis glutinosus*, and abounds very much in that viscid secretion which in the common E. also forms a kind of protecting sheath for the animal, and smooths its way.

EAR-TRUMPET, a contrivance for improving the hearing of the partially deaf. For this purpose many ingenious instruments have been devised. The principle in them all is the same: to collect the sonorous vibrations, and to convey them in an intensified form to the deeper parts of the ear. In this way the hand placed behind the external ear constitutes the simplest form of ear-trumpet. Though, in a great number of cases of impaired hearing, there can be no doubt that much assistance and comfort are obtained from the use of one or other of the varieties of the ear-trumpet, still they must not be used indiscriminately, for in unsuitable cases they often do much mischief, both by increasing the deafness, and aggravating the noises in the head from which deaf persons often suffer so much. They are of most use, perhaps, in advanced cases of nervous deafness, though injurious in the early stages of this complaint; they are hurtful also in all acute diseases of the organ, and of little or no use in those cases of great thickening of the contents of the middle ear, where the adapting power of the organ has been lost. There are many varieties of trumpet in common use. By far the most useful and comfortable are those which are worn on the head, which go by the name of ear-cornets or acoustic-auricles. They can be concealed under the hair or cap, and may be adapted to one or both ears by means of a spring over the head. The apparatus most commonly in use requires to be held in the hand, and consists of a narrow portion inserted into the ear-passage, and which gradually expands into a wide mouth; or the extremity of the instrument may be turned downwards, as in that form which passes by the name of Miss Martineau's trumpet. Another variety, applicable to the more severe cases of deafness, consists of an elastic tube, one end of which is tipped with ivory, and is placed in the ear of the patient; the other is held in the hand of the speaker, who applies his mouth to the open extremity. With this instrument only one voice can be heard at a time. With the first-mentioned variety, general conversation can be heard often quite well. Ear-trumpets are generally made of some thin metallic substance, such as tin. Gutta-percha, vulcanite, and other substances, are also frequently used.

EARWIG, *Forficula*, a genus of orthopterous insects, recently subdivided into a number of genera, and forming the family *forficulidæ*, which many entomologists constitute into a distinct order, *dermaptera* (Gr. leather-winged). These insects indeed connect the true *orthoptera* with the *coleoptera*. Their legs are formed for running, and not for leaping; their wing-covers (*elytra*)—which are very small, and hide only a small part of the abdomen—are of firmer substance than in the other *orthoptera;* the wings, of which there are two sets—hind and fore wings—are curiously folded under them, both longitudinally, in a fan-like manner, and transversely; the organs of the mouth resemble those of the true *orthoptera*, with which also earwigs agree in the important character of *semi-complete* metamorphosis; the larvæ and pupæ much resembling the perfect insect, running about and feeding in the same manner, but the larvæ being destitute of wings and wing-covers, the pupæ having them only in a rudimentary state. Earwigs have the body narrow, and of nearly equal breadth throughout, the head exposed, the mandibles very strong and horny, the antennæ long and thread-shaped. The abdomen bears at its extremity a large pair of forceps, apparently of use as an instrument of defence. Earwigs abound in moist situations, as under the decayed bark of trees, under stones, among decaying straw, etc. They feed both on animal and vegetable food; the COMMON E. (*F. auricularia*), very abundant in Britain and in most parts of Europe, is troublesome to gardeners by eating the leaves of plants and the petals of fine flowers; but the injury which it does is probably more than compensated, particularly as to field-crops, by the destruction of multitudes of smaller insects, as *thrips, aphis*, etc. The appearance of this insect is by no means agreeable, and its mandibles and forceps are suggestive of unpleasant possibilities, which, however, would seem never to be realized, although it is a very frequent visitor of houses, particularly those of which the

walls are covered with foliage. It is curious how extensively prevalent the notion is that earwigs creep into the ear. To this they owe their English name (E. from *ear*, and Sax. *wicga*, a worm or grub), and their names in many languages, as the French *perceoreille*, the German *Ohrwurm*, etc. Newman, in his *Introduction to the History of Insects*, says: "The shape of these wings (the hind ones), when fully opened, is nearly that of the human ear; and from this circumstance it seems highly probable that the original name of this insect was ear*wing*." It is agreeable to the general habits of the E. to creep into holes, yet there is apparently no authenticated instance of an E. entering the ear of a human being. Of their habit of creeping into holes, particularly to hide during the day, gardeners take advantage to make earwig traps of different descriptions.

An interesting peculiarity in the habits of these insects remains to be noticed. The female E. sits upon her eggs and hatches them like a hen; she also gathers her young ones around her and under her in the most affectionate manner. The observations of De Geer on this point have been confirmed by Mr. Spence and others.

EAS'DALE, a small isle on the w. coast of Argyleshire, in the firth of Lorn, 10 m. s.s.w. of Oban. It contains 1¼ sq.m., and is situated in Kilbrandon parish. It is noted for its primary or metamorphic slate-quarries, belonging to the marquis of Breadalbane, which have been wrought for more than 150 years, and supply 4 or 5 millions of slates yearly. Compact feldspar and conglomerate also occur in the isle.

EASEL. This structure, the object of which is to support the canvas or panel of the artist at a convenient height for work, has been used for ages pretty much in its present form.

EASEMENT, in English law, has been defined to be "a privilege without profit, which the owner of one neighboring tenement hath of another, existing in respect of their several tenements, by which the servient owner is obliged 'to suffer or not to do' something on his own land for the advantage of a dominant owner."—Gale on *Easements*. The rights comprehended under the title of easements are of a very important kind; they include rights of water, rights of way, rights to light and air, rights to support from a neighboring soil or house, rights to carry on an offensive trade, etc. An E. is an incorporeal hereditament (q.v.), and corresponds in many respects with a servitude (q.v.) in Scotch law. But an E. is more limited than a servitude, inasmuch as it comprehends those rights only which carry no title to the profit of the soil. These latter rights are in England known as profits *a prendre* (q.v.). An E. cannot exist apart from an estate in land, it being necessary that there should be two tenements, the one enjoying the right (dominant), the other over which it is enjoyed (servient). An E. must be constituted by deed or by prescription (q.v.). It may be extinguished by an actual or implied release. When a party entitled to the enjoyment of an E. is disturbed in that enjoyment, he may enforce his right by action at law, or he may enter upon the servient tenement, and abate the nuisance himself. The American law on the subject of E. is regulated by the same principles that prevail in England. See Kent's *Commentaries on American Law*.

EASEMENT (*ante*), a legal term signifying some right of the public, or of an individual, in lands owned by another; a right existing either at common law or by statute; such, for example, as the right of way across another's estate, or to receive water from, or discharge it across, such estate. The E. is either affirmative or negative; affirmative when the owner of an estate is entitled to do something on the estate of another; negative when he is forbidden to do something, otherwise lawful, on his own premises. It may arise from the nature of things, or from special contract, express or implied. It is an E. when the owner of land makes a grant thereof for public use, as for a road or park, whereby the public gains only a right of use for the purpose specified, the title still remaining with the grantor. An E. in the land of another may also be acquired by prescription—that is, by the continuous and open enjoyment of a privilege without objection for a certain term of years. Easements may be extinguished by release or abandonment, or by a union of the two estates in the same person.

EAST (Ger. *Ost;* allied probably to Greek *eōs*, the morning, and Lat. *oriens*, the rising, i.e., sun) is, vaguely speaking, that quarter of the horizon where the sun rises, or which a person with his face to the s. has on his left hand. It is only at the equinoxes that the sun rises exactly in the e. point. A line at right angles to the meridian of a place points exactly e. and west. See MERIDIAN and HORIZON.

From very early times, the e. has been invested with a certain sacred character, or at least held in respect over other points of the compass. It was the practice of the ancient pagans to fix their altar in the eastern part of their temples, so that they might sacrifice towards the rising sun, which in itself was an object of worship. The custom of venerating the e. was perpetuated by the early Christian church from various circumstances mentioned in the sacred record. For example: "The glory of the God of Israel came from the way of the east."—Ezek. xliii. 2. "There came wise men from the east to Jerusalem."—Matt. ii. 1. "And, lo, the star, which they saw in the east, went before them."—Matt. ii. 9. Tradition heightened respect for the east. It was said that Christ had been placed in the tomb with his feet towards the e., and that at

the day of judgment he should come from the eastward in the heavens. Looking towards the sun in the e. in praying or repeating the creed, was thought to put worshipers in remembrance that Christ is the son of righteousness, and such an attitude was accordingly adopted as an aid to devotion. From these various circumstances, the building of churches with the chancel (q.v.) to the e., bowing to the e. on uttering the name of Jesus, and burying with the feet to the e., were introduced as customs in the church. In recent times there has been a general disregard to the practice of turning formally with the face to the e. on repeating the creed, and, as is well known, the attempt to revive it by a party in the English church has caused considerable dispeace. It is a curious instance of the inveteracy of popular custom, that in Scotland, where everything that savored of ancient usage was set aside as popish by the reformers, the practice of burying with the feet to the e. was maintained in the old churchyards, nor is it uncommon still to set down churches with a scrupulous regard to e. and west. In modern cemeteries in England and Scotland, no attention appears to be paid to the old punctilio of interring with the feet to the e., the nature of the ground alone being considered in the disposition of graves.

EAST ABINGTON, a village in Plymouth co., Mass., 20 m. s.e. of Boston, on the Old Colony railroad; pop. 4,600. The principal business is the manufacture of boots and shoes.

EAST BATON ROUGE, a parish in s.e. Louisiana, between the Mississippi and Amite rivers, 450 sq.m.; pop. '70, 17,816—11,343 colored; in '80, 20,016. Surface, generally level, with fertile soil, producing corn, cotton, sugar, molasses, etc. Seat of justice, Baton Rouge.

EAST BIRMINGHAM, Penn. See PITTSBURG.

EASTBOURNE, a rising watering-place in the s.e. of Sussex. It lies in a chasm between two cliffs, one of which, 3 m. to the s.s.e., forms Beachy head. In the vicinity are fine drives and walks. It has a martello tower and a fort. Pop. of parish '71, 10,361. E. is supposed to have been of Roman origin, and remains of a Roman villa, bath, and tesselated pavements have been found here.

EAST BRIDGEWATER, a t. in Plymouth co., Mass., 25 m. s.e. of Boston, on the Old Colony and Newport railroad; pop. '70, 3,017. There is abundant water power, and manufacturing is the leading business.

EASTBURN, JAMES WALLIS, 1797–1819; b. England; came to America when a child; graduated at Columbia college in 1816, and studied theology with the purpose of taking orders in the Episcopal church. While a student he began a new metrical version of the Psalms. He was joint author with Robert C. Sands of *Yamoyden*, a romance founded upon the life of Philip, the Narragansett king; and he wrote many small poems. In 1818, he was ordained and took charge of a church in Virginia, but died while on a voyage to the West Indies for his health.

EASTBURN, MANTON, D.D., 1801–72; b. England; brother of James Wallis; came to the United States when a child; graduated at Columbia college, 1817; studied in the Episcopal theological seminary, and was ordained to the ministry, 1825. He was for several years rector of the church of the Ascension, New York, and in 1843 became bishop of Massachusetts. He published *Lectures on Hebrew, Latin, and English Poetry; Essays and Dissertations on Biblical Literature; Lectures on the Epistle to the Philippians;* and many sermons and addresses. He gave the most of his property to religious and benevolent institutions.

EAST CAPE, the name of the most easterly headlands of the island of Madagascar, of the North island of New Zealand, and of Siberia or Asiatic Russia. The *first* is in lat. 15° 20′ s., and long. 50° 15′ e.; the *second* in lat. 37° 40′ s., and long. 178° 40′ e., being almost precisely the antipodes of Carthagena in Spain; and the *third* is that extremity of the old world which is nearest to the new, being separated by Behring's strait (q.v.) from cape Prince of Wales in America. It is in lat. 66° 6′ n., and long. 169° 38′ w.; or rather, to follow the natural reckoning, 190° 22′ east.

EASTER (Ger. *ostern*, Fr. *paque*, Scot. *pasch*, from Gr. *pascha*, the passover), the festival of the resurrection of Jesus Christ, derives probably its Teutonic name from the festival of the goddess Ostara, in Ang.-Sax. Eastre, which the Saxons of old were wont to celebrate about the same season at which the Christian festival of E. occurs. In the ancient church, the celebration of E. lasted 8 days. After the 11th c., however, it was limited to 3, and in later times, generally to 2 days. It was formerly the favorite time for performing the rite of baptism. The courts of justice were closed, and alms dispensed to the poor and needy, who were even feasted in the churches—a custom which led to much disorder. Slaves also received their freedom at that season; and as the austerities of Lent were over, the people gave themselves up to enjoyment; hence the day was called the "Sunday of joy" (*Dominica gaudii*). To the popular sports and dances were added farcical exhibitions, in which even the clergy joined in some places, reciting from the pulpit stories and legends, with a view to stir the hearers to laughter (*risus paschalis*). Against this indecency, the reformers of the 16th c. loudly and successfully raised their voices. During the whole week before E.—that is, in the inter-

val between Palm Sunday and the beginning of the E. festival—daily services were held. See PASSION WEEK and GOOD FRIDAY.

On E. day, the people saluted each other with the E. kiss, and the exclamation *Surrexit* (He is risen); to which the reply was *Vere surrexit* (He is risen indeed). The chief solemnity always consisted of the celebration of the Lord's supper.

The proper time for the celebration of E. has occasioned no little controversy. In the 2d c., a dispute arose on this point between the eastern and western churches. The great mass of the eastern Christians celebrated E. on the 14th day of the first Jewish month or moon, considering it to be equivalent to the Jewish Passover. The western churches celebrated it on the Sunday after the 14th day, holding that it was the commemoration of the resurrection of Jesus. The council of Nice (325 A.D.) decided in favor of the western usage, branding the eastern usage with the name of the "quartadeciman" heresy. This, however, only settled the point that E. was to be held, not upon a certain day of the month or moon, but on a Sunday. The proper astronomical cycle for calculating the occurrence of the E. moon was not determined by this council. It appears, however, that the metonic cycle (q.v.) was already in use in the west for this purpose; and it was on this cycle that the Gregorian calendar, introduced in 1582, was arranged. The method on which this calendar is constructed is too complex for description here. An elaborate account of the whole matter was published by prof. De Morgan in the *Companion to the British Almanac* in 1845, and to this the reader is referred. The time of E. being the most ancient and important of all the movable feasts of the Christian church, determines all the rest. It was debated, at the time of the introduction of the Gregorian calendar, whether E. should continue to be movable, or whether a fixed Sunday, after the 21st of Mar., should not be adopted. It was deference to ancient custom that led the ecclesiastical authorities to adhere to the method of determination by the moon. It must be remembered, however, that it is not the actual moon in the heavens, nor even the mean moon of astronomers, that regulates the time of E., but an altogether imaginary moon, whose periods are so contrived that the new (calendar) moon always follows the real new moon (sometimes by 2, or even 3 days). The effect of this is, that the 14th of the calendar moon—which had, from the times of Moses, been considered "full moon" for ecclesiastical purposes—falls generally on the 15th or 16th of the real moon, and thus after the real full moon, which is generally on the 14th or 15th day. With this explanation, then, of what is meant by "full moon," viz., that it is the 14th day of the calendar moon, the rule is that E. day is always the first Sunday after the paschal full moon, i.e., the full moon which happens upon or next after the 21st of Mar. (the beginning of the ecclesiastical year); and if the full moon happens upon a Sunday, E. day is the Sunday after. For any given year, the day on which the paschal full moon falls, and then E. day, are found by the following table and rule:

Days of the Month.	Dominical Letter.	Golden Number	Days of the Month.	Dominical Letter.	Golden Number.
March 21	C	14	April 8	G	..
" 22	D	3	" 9	A	15
" 23	E	..	" 10	B	4
" 24	F	11	" 11	C	..
" 25	G	..	" 12	D	12
" 26	A	19	" 13	E	1
" 27	B	8	" 14	F	..
" 28	C	..	" 15	G	9
" 29	D	16	" 16	A	..
" 30	E	5	" 17	B	17
" 31	F	..	" 18	C	6
April 1	G	13	" 19	D	..
" 2	A	2	" 20	E	..
" 3	B	..	" 21	F	..
" 4	C	10	" 22	G	..
" 5	D	..	" 23	A	..
" 6	E	18	" 24	B	..
" 7	F	7	" 25	C	..

First ascertain the dominical letter (q.v.)—taking the second where there are two—and the golden number (see EPACT); look for the golden number in the third column of the table, and opposite to it stands the day of the full moon; then look for the dominical letter, next after the day of full moon, and the day standing opposite the dominical letter is E. day. It sometimes happens that E. day, as thus determined, is different from what it would be if by "full moon" were understood the astronomical full moon. Thus, in 1818, E. day, by the calendar, fell, and was celebrated on the 22d of Mar., the earliest possible day, although the full moon was on that day; and in 1845, it again fell on the day of the actual full moon (the 23d of Mar.).

One object in arranging the calendar moon was, that E. might never fall on the same day as the Jewish Passover. They did occur together, however, in 1805, on the 14th of April; and in 1825, on the 3d April; and will do so again in 1903, on the 12th April;

in 1923, on the 1st April; in 1927, on the 17th April; and in 1981, on the 19th April. The Jewish festival usually occurs in Passion week, and never before the 26th of Mar., or after the 25th of April (new style). On the other hand, the Christian festival is never before the 22d of Mar., or after the 25th of April. In 1761 and 1818, E. fell on the 22d of Mar.; but neither in this nor the following century will such be the case again. In 1913, it will fall on the 23d of Mar., as it did in 1845 and 1856. The latest Easters in this century and the following, occur in 1886 and 1943, on the 25th of April. In 1848, E. fell on the 23d of, and in 1859, on the 24th of April.

Popular Observances.—Many of the popular observances connected with E. are clearly of pagan origin. The goddess Ostara or Eastre seems to have been the personification of the morning or east (q.v.), and also of the opening year or spring. The Anglo-Saxon name of April was Estormonath; and it is still known in Germany as Ostermonath. The worship of this being seems to have struck deep root in northern Germany, and was brought into England by the Saxons. It continued to be celebrated in many parts in the n. of Germany down to the beginning of the present century, by the kindling of bonfires and numerous other rites. See BELTEIN. Like the May observances of England, it was especially a festival of joy. With her usual policy, the church endeavored to give a Christian significance to such of the the rites as could not be rooted out; and in this case, the conversion was particularly easy. Joy at the rising of the natural sun, and at the awaking of nature from the death of winter, became joy at the rising of the Sun of Righteousness—at the resurrection of Christ from the grave. The bonfires can be traced in the great "paschal tapers," sometimes weighing 300 lbs., with which the churches were lighted on E. eve. In the ancient church disbursements of St. Mary-at-Hill, in the city of London, there is even an entry "For a quarter of coles for the hallowed fire on Easter eve, 6*d*."

The most characteristic E. rite, and the one most widely diffused, is the use of *Pasch* (i.e., Easter) *eggs*. They are usually stained of various colors with dye-woods or herbs, and people mutually make presents of them; sometimes they are kept as amulets, sometimes eaten; games are also played by striking them against one another. In some moorland parts of Scotland, it used to be the custom for young people to go out early on "Pasch Sunday" and search for wild-fowls' eggs for breakfast, and it was thought lucky to find them. There can be little doubt that the use of eggs at this season was originally symbolical of the revivification of nature—the springing forth of life in spring. The practice is not confined to Christians; the Jews used eggs in the feast of the Passover; and we are told that the Persians, when they keep the festival of the solar new year (in Mar.), mutually present each other with colored eggs.

From the Christian point of view, this "feast of eggs" has been usually considered as emblematic of the resurrection and of a future life.

EASTER (*ante*). The following are the dates for the occurrence of E. in each year from 1880 to the end of this century:

1880, March 28.	1885, April 5.	1889, April 21.	1893, April 2.	1897, April 18.
1881, April 17.	1886, April 25.	1890, April 6.	1894, March 25.	1898, April 10.
1882, April 9.	1887, April 10.	1891, March 29.	1895, April 14.	1899, April 2.
1883, March 25.	1888, April 1.	1892, April 17.	1896, April 5.	1900, April 15.
1884, April 13.				

Other principal days of observance may be found by reckoning from Easter. The first day of Lent (Ash Wednesday) is Wednesday in the 7th week before Easter. The Crucifixion day (Good Friday) is the Friday before Easter. The Ascension day is Thursday, the 40th day after Easter. The Pentecost day (Whitsunday) is the 50th day after E., or the Lord's day 7th after Easter.

EASTER ISLAND, originally DAVIS'S LAND, is a detached spot on the Pacific, in lat. 27° 20′ s., and long. 109° 30′ west. It is of volcanic origin, rising 1200 ft. above the sea; and it is moderately fertile, but almost destitute of water. It belongs to the Polynesian archipelago, of which it forms the south-easterly extremity. On this island, of 30 miles' circumference, and inhabited by less than 2,000 wretched savages, there exist multitudes of rude stone statues, some of them of colossal size, and standing on long platforms of Cyclopean masonry. The present inhabitants, whose language is radically the same as that of Tahiti, have no tradition of the race that made them. The existence of these sculptures is thought to strengthen the conclusion, arrived at on other grounds, that the Polynesian islands are relics of a submerged continent.

EASTERN ARCHIPELAGO. See MALAY ARCHIPELAGO, *ante*.

EASTERN CHURCHES include: I. The Greek church, which contains in Russia about 55,000,000; in Turkey, 11,500,000; in Austria, 3,000,000; in Greece, 1,225,000; and in the United States (chiefly in Alaska), 50,000; in all, more than 70,000,000. II. Armenians, 3,000,000. III. Copts and Abyssinians, 3,000,000. IV. Jacobites (in Turkey and India), 220,000. V. Nestorians, including the Christians of St. Thomas, in India, 165,000. The total in them all is about 76,500,000.

EASTERN EMPIRE. See BYZANTINE EMPIRE, *ante*.

EASTERN QUESTION, in popular usage, is the problem of the future disposition of the Turkish empire and its territory, as related to the supposed designs of Russia, and to the interests of other European nations, England and Austria in particular. Voltaire, in the time of Catherine II., characterized Turkey as "the sick man," and for a hundred years it has been an assumption of European diplomacy that the empire was on the road to disintegration and death. In these circumstances, Russia, from her geographical position and in accordance with her traditional policy, waits for an opportunity to seize and absorb the territory of "the sick man." Other European nations, each for reasons of its own, dread such an extension of Russian domination. Austria, if Turkey should be despoiled, would naturally claim for herself a slice of the territory; and England fears that if Constantinople should fall into the possession of Russia, the highway to her eastern possessions would be closed, and Russia become dominant in that quarter. The question, moreover, assumes a religious aspect, Turkey being a Mohammedan power, and Russia finding an excuse for aggressive designs in the assumed necessity of affording protection to the Christian populations in the Turkish empire. England, on the other hand, though at the head of the Christian powers, yet being anxious to preserve the autonomy of Turkey as a subservient empire, is placed in a position of seeming indifference to the wrongs which Russia is so zealous to redress. The Crimean war of 1854–56 had its origin in the desire to check the advance of Russia, and the treaty of Paris put that power under sharp restrictions. Russia, by the recent invasion of Turkey, roused again the hostility of the European powers, which found expression in the treaty of Berlin, greatly limiting the fruits of the Russian conquest, and putting that empire under annoying restraints. Turkey was made to promise certain reforms, which, if carried into effect, would deprive Russia of excuse for further aggressions; but the promise has not been and is not likely to be fulfilled: it is doubtful indeed whether the fulfillment is within the power of Turkey. The eastern question, therefore, has not yet reached a permanent solution, nor is its approach to such a solution now evident, especially as complications arising from the claims of Greece to an adjacent portion of Turkish territory are assuming (1880) a more threatening aspect.

EASTERN, or ORIENTAL RITE, the name given to the rituals of the Armenian, Coptic, Greek, and Syrian Roman Catholics, who, acknowledging the supremacy of the pope of Rome, have been allowed to retain their own modes of performing divine worship. These differ from the Latin, not only by being in the language common among the people, but also in continuing "communion in both kinds" to the laity, and marriage to the lower clergy. Among these branches of Roman Catholics there are about 80 bishops, of whom 5 are patriarchs and 26 archbishops.

EASTERN SHORE, the counties of Accomack and Northampton in Virginia, and all of Maryland lying e. of Chesapeake bay (sometimes including Delaware also). It is a fertile region, famous for its product of peaches and garden vegetables, and equally famous for oysters. The country, though low and level, is generally healthful, and the climate is mild and equable. It is intersected by railroads, and there is abundance of steam-boat navigation. Until invaded by railroads and overrun by small owners, this was the "blue blood" section of Virginia, noted for aristocracy and hospitality.

EASTER OFFERINGS, or EASTER DUES, small sums paid to the parochial clergy in England by their parishioners at Easter, as a compensation for personal tithes, or the tithe for personal labor.

EASTER TERM, LEGAL. For a general history of the law terms in England, see LAW TERMS. E. T. was formerly dependent upon the movable feast of Easter, and was hence called a movable term. It commenced on the Wednesday fortnight after Easter Sunday, and lasted till the following Monday three weeks. But by 11 Geo. IV. and 1 Will. IV. c. 70, amended by 1 Will. IV. c. 3, E. T. now begins on 15th April and ends on 8th May. If any of the days between the Thursday before and the Wednesday after Easter fall within term, no sittings in banc (q.v.) are held on those days, and the term is prolonged a corresponding number of days.

EAST FELICIANA, a parish in s.e. Louisiana, on the Mississippi and Amite rivers, reached by the Clinton and Port Hudson railroad; 500 sq.m.; pop. '70, 13,499—9,393 colored. It is generally level, well-watered, and fertile; producing corn, cotton, rice, etc. Seat of justice, Clinton.

EAST HADDAM, a t. in Middlesex co., Conn.; on the e. bank of the Connecticut river, about 16 m. from its mouth, and 30 m. below Hartford; pop. '70, 2,951. It has considerable cotton manufacture and some trade. The surface is hilly; and among the hills in the n.e. part, near the river, remarkable subterraneous noises, as of rumbling and jarring, have occasionally been heard, though of late years more rare than formerly. The sound is called "Moodus noise," from the name given to the region by the Indians, who ascribed to the sound a supernatural origin. Its cause has not been ascertained.

EAST HAMPTON, a t. in Hampshire co., Mass., on the New Haven and Northampton railroad, in the beautiful valley of the Connecticut, 5 m. s.w. of Northampton; pop. '70, 3,620. Its manufactures are various and extensive. It has a good public library, many good schools, and fine public buildings, such as a town-hall and churches. Williston seminary for young men, founded here by Samuel Williston, and endowed

by him with more than a quarter of a million dollars, is a school of the highest grade below the collegiate, and has for many years attracted large numbers of students.

EAST HAMPTON, a t. in Suffolk co., N.Y., comprising the e. end of Long Island, including the peninsula of Montauk; reached by the Long Island railroad; pop. '75, 2,299. Much of the land is a narrow, sandy tract, between the ocean and the sound, of little value. The w. portion is fertile, producing fruits, vegetables, etc. The extreme e. part, known as Montauk, is a breezy, grassy upland, scarcely inhabited, affording fine pasturage to immense herds of cattle. The village of East Hampton is 7 m. s.e. of Sag Harbor, and a mile from the ocean. It is an agreeable and popular summer resort.

EAST HUMBOLDT MOUNTAINS, in Elko co., Nevada; a range with peaks 15,000 ft. high; for the most part well-wooded. Fremont's pass is in this range.

EAST INDIA ARMY. When the East India company (q.v.) first sent factors or agents to India, an army was not thought of. Military forces arose out of the exigencies of the times. Some of the first troops in the company's pay were mere adventurers; some were liberated convicts; some deserters from European armies. Gradually organization was introduced, and improved arms furnished. As the power of the company increased, natives entered the battalions; until at length most of the troops were Hindus or Mohammedans, drilled by non-commissioned officers sent out from England. A few regiments were raised in England; a much larger number were raised in India; but all alike were officered by the company's favored English officers, largely paid, and having many opportunities for making rapid fortunes. The ranks were filled by enlistment; the company never compelled the natives to become soldiers; the pay offered was always such as to induce a sufficient number of men to enter. Their periods of leave of absence were liberal; and after a certain number of years' service, they retired on a pension sufficient to support them for the remainder of their days.

At the period immediately preceding the outbreak of the revolt in 1857, the army in the pay of the company comprised about 24,000 royal troops (lent to, and paid for by, the company); 18,000 European troops, raised and drilled by the company in England; 180,000 native regulars; and 60,000 native irregular horse—making about 280,000 in all. This large force was irrespective of 40,000 contingents furnished by dependent native princes, and of the native armies belonging to the independent and semi-independent princes. The company's troops formed three distinct armies, each under its own commander-in-chief, and each stationed in one particular presidency. In these three armies, three kinds of troops—Europeans, native regulars, and native irregulars—had their own special organization. In order to secure unity of action when necessary, it was customary to give the commander-in-chief of the Bengal army precedence over those of Madras and Bombay; he was, in effect, commander-in-chief of the whole of the company's forces. There were too few English officers with the native regiments, and these, in most cases, knew too little of the men under their command. This was not the *cause* of the revolt in 1857, but it was one of the circumstances that led to the rapid spread of the revolt when once begun. To what extent this fine army melted away during 1857 and the two following years, is described under INDIA. Speaking generally, it may be said that the armies of the Madras and Bombay presidencies remained faithful, especially the infantry. It was in the Bengal army that the disruption chiefly occurred. The irregulars, both cavalry and infantry, raised amongst the Sikhs and Punjabees, were in almost every case faithful.

In Aug., 1858, the act which transferred the government of India from the company to the crown received the royal assent. The army was transferred as well as the political power. As the Sikhs had behaved well, most of the regiments from the Punjab were retained, as well as most of the native regiments in the Bombay and Madras presidencies; but it was not deemed expedient to restore the native regiments of Bengal proper, which had proved so treacherous. In that year, at the suggestion of earl Canning, a committee was appointed to inquire into the whole circumstances relating to the reorganization of the army. The company originated the inquiry, but the commissioners did not make their report till after the transfer of the company's powers to the crown. Although the commissioners' report was presented in the summer of 1859, very little was effected during the remainder of that year, or in 1860, to reorganize the Indian army; matters were kept together in a provisional way. Meanwhile, when the European troops of the company's army were turned over to the crown, a disturbance, amounting almost to a mutiny, occurred. The men claimed that, as they had enlisted into the company's service, they ought not to be transferred without their own consent asked, or without receiving a bonus on re-enlisting. To prevent a dangerous excitement, the government allowed such as chose to retire.

In 1861, an act was passed reorganizing the Indian army. The *British* portion of it now forms part of the queen's army generally, with certain honorary distinctions, and takes its turn at home and in the colonies like the rest; but the expenses are paid out of Indian, not imperial revenues. The *native* portion is managed wholly in India; but during the eastern crisis, connected with the war between Russia and Turkey, a considerable force of native Indian troops was sent to Malta, for service in Europe—in case of England being involved in war. On the reorganization of the Indian army in 1861,

the 21st hussars, with the 105th, 106th, 107th, 108th, and 109th foot, were formed from the European troops previously in the service of the East India company.

EAST INDIA COMPANY. On the 31st Dec., 1600, a charter was granted by queen Elizabeth to a number of London merchants, under the title of "The Governor and Company of Merchants of London trading to the East Indies." From the time when Vasco da Gama effected the eastern passage to India, by doubling the cape of Good Hope, in 1497, the Portuguese carried on an extensive trade with that country, unaffected by rivals until nearly a century afterwards, when the Dutch and the English began to compete with them. This competition became formidable when two "East India companies" were established, one at Amsterdam and one in London. It is of the latter of these that we here treat. The charter was exclusive, as is usual in such cases; prohibiting the rest of the community from trading within the limits assigned to the company. Those limits were enormous, comprising the whole space, land and sea, from the cape of Good Hope eastward to cape Horn—i.e., the whole of the Indian and Pacific oceans. The charter was for fifteen years. The company speedily sent out ships to Java and Sumatra, which returned with calicoes, silk, indigo, and spices. It was then determined to make some kind of settlements on the coast of Hindustan itself; and about 1612, the company obtained permission from the native princes to establish factories or agencies at Surat, Ahmedabad, Cambay, and Gogo.

The company's charter was renewed from time to time, with various modifications, but not without much contention and difficulty. Gradually establishments were formed in Java, Sumatra, Borneo, Celebes, Malacca, Siam, the Banda islands, and other places in the east; as well as on the Coromandel and Malabar coasts of India itself. The first beginning of Madras dates in 1640, of Calcutta in 1645, and of Bombay in 1665, as chief establishments of the company. In 1662, Charles II. gave them permission "to make war and peace on the native princes"—a privilege of which they largely availed themselves for nearly 200 years.

In 1698, the crown granted a charter to a *new* E. I. C., who offered a loan of £2,000,000 to the state; but this naturally led to wranglings, and the two companies were united into one by an act of parliament passed in 1702. The constitution then established was maintained with little alteration as long as the company existed. Every shareholder who held £500 of the company's stock became a member of the court of proprietors, and this court had legislative functions in all that related to the company's affairs. The proprietors annually chose 24 to form a court of directors, from those of their number who held not less than £2,000 of stock. Six of the directors went out of office every year; they retired in rotation, so that each had four years of office. It was a general custom with the proprietors to elect the same persons as directors over and over again. The court of proprietors was to meet once a year, or oftener if necessary; the court of directors as often as the directors chose, provided 13 were present. Theoretically, the constitution of the company was very democratic; but practically the affairs were in the hands of the directors; for the proprietors took little other interest than in receiving their half-yearly dividends. The proprietors had from one to four votes each, according to the amount of stock held by them. The board of control, of later formation, bore relation to the governmental affairs of India.

Properly speaking, the company were only merchants: sending out bullion, lead, quicksilver, woolens, hardware, and other goods to India; and bringing home calicoes, silk, diamonds, tea, porcelain, pepper, drugs, saltpeter, etc., from thence. Not merely with India, but with China and other parts of the east, the trade was monopolized by the company; and hence arose their great trade in China tea, porcelain, and silk. By degrees, avarice and ambition led the company, or their agents in India, to take part in the quarrels among the native princes; this course gave them power and influence at the native courts, from whence arose the acquisition of sovereign powers over vast regions. India thus became valued by the company, not only as commercially profitable, but as affording to the friends and relations of the directors opportunities of making vast fortunes by political or military enterprises. It is not the purpose of the present article to trace the political affairs of the company, or the rise of a British empire in India; that will be done under INDIA, BRITISH; it will suffice here merely to state, that no *national* or *patriotic* motive marked the beginning of this course.

In 1744, the company obtained a renewal of their charter till 1780, but not without a loan of £1,000,000 to government; for the monopoly was distasteful to the nation at large. France, too, had an E. I. C., and the struggles between the two companies for power in the southern part of India, led to constant warfare between them during the remainder of the century. Other loans to government were the means of obtaining further renewals of the charter in later years. In 1833, the legislature took away all the *trading* privileges of the company. The dividends to proprietors of East India stock were thenceforward to be paid out of taxes imposed by the company on the people of India, in such provinces as were under British dominion. From that year the company's powers became anomalous; the company could not *trade*, and could not *govern* without the sanction and continued interference of the imperial government. The wars in India, since that year, have been waged by England as a nation, rather than by the company; and England practically, though not nominally, became responsible for the

enormous cost of those wars. In 1853, the charter was again renewed, with a further lessening of the power of the company, and an increase of that of the crown.

Had not the Indian revolt occurred in 1857, the last charter would have remained in force until 1873; but that gigantic calamity led to the resolution—a resolution the wisdom of which was disputed by many of the best judges of Indian affairs—of concentrating the power in the hands of the imperial government. In spite of a strenuous resistance, in 1858, the company were forced to cede their powers, by an act which received the royal assent on the 2d of August. The charter of 1853 had provided that £6,000,000 of India stock should have 10½ per cent dividend *guaranteed* by England out of the revenues of India; and that parliament should redeem this stock at cent per cent premium any time after the year 1873. The act of 1858, therefore, contained due clauses for carrying out these provisions, and transferred the whole of the company's powers to the crown.

The company continued to exist, but for little other purpose than that of receiving and distributing dividends. Most of the distinguished men, military and political, till then in the company's service, accepted office under the crown, to assist the government by their general knowledge of Indian affairs. These affairs are now managed by a secretary in council at the new India office. The valuable library and museum of the company have passed over to the crown; and an act of parliament (1873) provides for the paying off of the India stock, and the final extinction of the once famous East India company.

EAST INDIES, as distinguished from *West Indies,* include not merely the two great peninsulas of southern Asia, but likewise all the adjacent islands from the delta of the Indus to the northern extremity of the Philippines. They thus extend, to use round numbers, in lat. from 35° n. to 10° s., and in e. long. from 65° to 130°. At one time, the name of India had, towards the e., a still wider application, occasionally comprising Japan, nay, everything in that direction except China alone. See INDIA.

EASTLAKE, Sir CHARLES LOCK, president of the royal academy of London, was b. at Plymouth in 1795, educated at the charter-house in London, and entered as a student at the royal academy. Subsequently, he went to Paris, where he studied and copied the great paintings then collected in the Louvre. The return of Napoleon from Elba compelled him to leave France. He went back to his native town, and supported himself by portrait-painting. When the *Bellerophon,* with Napoleon on board, appeared in the port of Plymouth, E. profited by the opportunity, and produced his first important picture, "Napoleon at the Gangway of the *Bellerophon,* attended by some of his Officers." In 1817, sir Charles visited Italy and Greece, sketching assiduously in both countries. During a residence of several years in Rome, he executed his "Girl of Albano leading a Blind Woman to Mass," "Isidas the Spartan," "Pilgrims arriving in Sight of Rome," and many others, illustrative of Italian customs and scenery. In 1827, he was elected an associate, and in 1830, a full member of the royal academy. His "Greek Fugitives Prisoners to Banditti," etc., added to his already great reputation; and in 1841, appeared what many conceive to be his masterpiece, "Christ lamenting over Jerusalem." It was immensely admired, the duplicate painted for Mr. Vernon being reckoned one of the most valuable pictures in the Vernon gallery. "Hagar and Ishmael" was exhibited in 1844; "Heloise" in 1845; "The Escape of Francesco Novello di Carrara with Taddea d'Este, his Wife, from the Duke of Milan," in 1850; "Beatrice" in 1855, etc. In 1850, he was elected president of the royal academy, when he received the honor of knighthood. Subsequently, he was appointed director of the national gallery, in which capacity his services were of the highest importance; for besides its improved arrangement, many of the most valuable specimens of the best schools were added to the collection. Sir Charles also acquired a high reputation as a writer on art. In 1847, he published *Materials for the History of Oil Painting,* a work of great learning and research. He contributed several articles to the *Penny Cyclopædia* on subjects belonging to his profession, and executed a translation of Goethe's *Farbenlehre.* In 1853, he received the title of D.C.L. from the university of Oxford. He died Dec., 1865.—LADY EASTLAKE (b. Elizabeth Rigby) is an artist of no mean power, and also has distinguished herself as an authoress by her *Letters from the Baltic; Livonian Tales;* and her articles on subjects connected with art in the *Quarterly Review.*

EASTLAND, a co. in n.w. Texas, on Leon river; 900 sq. m.; pop. '70, 88. Cattle raising is the only industry.

EAST LIVERPOOL, a village in Columbiana co., O., on the Ohio river, and the Pittsburg and Cleveland railroad; pop. '70, 2,105. Manufactures of pottery, china, and parian ware are among the leading industries.

EAST MAIN, formerly a portion of the Hudson bay territories, now incorporated in the dominion of Canada, is bounded n. by Hudson's strait, and w. by Hudson's bay down to its southern extremity, meeting Labrador on the e., and Canada on the south. This immense region, thrice as large as Great Britain, is generally bleak and sterile, yielding little to commerce but fish-oil and a few furs.—A river of the same name, otherwise called the *Slade,* crosses its southern section, entering Hudson's bay, here known as James's bay, about lat. 52° 15′ n., after a course of 400 miles.

EASTMAN, CHARLES GAMAGE, 1816-61; b. Me.; removed with his parents to Vermont, and was editor of the Burlington *Sentinel, Spirit of the Age,* and *Vermont Patriot.* He was a member of the state senate for several years. In 1848, he published a volume of poems.

EASTMAN, MARY HENDERSON, b. Va., 1818; daughter of Dr. Thomas Henderson, and wife of capt. Seth Eastman, of the U. S. army. He was stationed for several years in the Indian country, where his wife wrote *Dahcotah, or Life and Legends of the Sioux; Romance of Indian Life;* and other works of the kind. In 1852, she published *Aunt Phillis's Cabin,* in response to Mrs. Stowe's famous *Uncle Tom's Cabin.* She has also published the *American Aboriginal Portfolio,* and *Chicora and other Regions of the Conquerors and the Conquered.*

EAST NEW YORK, a large village or city adjoining the city of Brooklyn, in Kings co., N. Y. It may be considered a part of Brooklyn, having no distinctive features of its own. It is mainly on a high ridge, and affords a fine view of the rich garden lands in the s. part of Kings co., the numerous villages, Jamaica bay, and the ocean beyond, Coney island, and Rockaway beach. The pop. is about 12,000.

EASTON, a flourishing t. of Pennsylvania, in the United States, stands in the fork between the rivers Delaware on the e. and Lehigh on the w., about 20 m. above the head of navigation on the united streams. Though the place is thus far cut off from the sea, yet, for internal trade, it clearly occupies a commanding position. Its natural advantages, too, have been largely improved. To say nothing of railways, E. is the common terminus of three canals—one of 60 m., down on the right side of the Delaware as far as Bristol; another of 84 m., along the Lehigh, into the great coal-field of the state; and the third of 102 m., leading across the country to Jersey City. Within the immediate neighborhood, likewise, iron ore and limestone abound. Having an unlimited supply of water-power, the town possesses extensive manufactories. It is the seat of Lafayette college, founded in 1832. Pop. '70, 10,987.

EASTON, JAMES, b. Conn. He was a col. in the revolutionary army, raising a regiment by his own exertions, and spent his entire fortune for the service. He was one of the leaders in the capture of Ticonderoga, and brought the news of the victory to the provincial congress. He was also with Montgomery in the invasion of Canada. In Jan., 1776, he received the thanks of congress, but was forced through the enmity or jealousy of Benedict Arnold to quit the service in that year.

EASTON, NICHOLAS, b. Wales, 1593; d. R. I., 1675. He came to Massachusetts, 1634; in 1638, he removed to Rhode Island, and built the first house in Newport. He was governor of the colony in 1650. His son John was governor in 1690–95, and was the author of a *Narrative of the Causes which led to King Philip's War.*

EAST ORANGE, a t. in the co. of Essex, N. J., lying between Newark on the e, and Orange on the w., and on the line of the Delaware, Lackawanna and Western railroad, by which it is connected with New York and the west. It is growing rapidly; and has an intelligent and thriving population, being the residence of a large number of people doing business in New York. It has 10 or 12 churches, excellent schools, a weekly newspaper, and numerous handsome private residences. The principal streets are macadamized; many of them are bordered with fine shade-trees, and lighted with gas. Pop. '70, 6,500.

EASTPORT, a garrison t. of Maine, in the United States, is situated on one of the small islands of Passamaquoddy bay, which receives the St. Croix, the international boundary during its whole course between the United States and British America. On the coast, therefore, it may be said to be the frontier town of the union towards the n. e. Its harbor is deep enough for the largest vessels. The tide rises within it to a height of 25 ft.—a height far exceeded in many other parts of the bay of Fundy, of which Passamaquoddy bay is an inlet. The place is largely engaged in the fisheries and in shipbuilding. Pop. '70, 3,738.

EAST RIVER, the strait between Long Island sound and New York harbor. It is 20 m. long, separating New York city on the w. from its suburbs, Williamsburg and Brooklyn, on the east. Its narrowest part is the Hurlgate or Hellgate, which is about the middle of its course. Here the rocks, which once obstructed the passage, have been removed by blasting. The name—clearly a misnomer for an arm of the sea—is convenient as contrasted with the North river, or Hudson, and may have arisen from the river-like action of the tides—an action so powerful as to have here and there materially deepened the channel.

EAST SAGINAW, a city in Saginaw co., Mich., at the head of steamboat navigation on the Saginaw river, 17 m. from its mouth. It is on the Flint and Père Marquette, and the Jackson and Saginaw railroads, and is the terminus of the Saginaw Valley and St. Louis railroad. Pop. '74, 17,084. It has an important lumber and salt trade, sending out 135,000,000 ft. of lumber annually from its 17 saw-mills, and 200,000 barrels of salt. It is handsomely laid out, and built; and has horse railroads and water-works. It is the prosperous center of a fertile surrounding country; the yearly increase of population having reached 40 per cent. The city of Saginaw is on the opposite side of the river.

EATON, a co. in s. Michigan, on Grand river, intersected by the Chicago and Lake Huron, and the Grand River Valley division of the Michigan Central railroad; 576 sq.m.; pop. '74, 26,907. The surface is undulating, and the soil productive. Wheat, corn, barley, maple sugar, butter, and wool are the chief staples. Co. seat, Charlotte.

EATON, Amos, 1776–1842; b. N. Y.; graduated at Williams college in 1799, and became a lawyer and surveyor at Catskill, N. Y. He studied natural sciences and lectured on botany, chemistry, geology, and mineralogy, and with Drs. T. Romeyn Beck and Lewis C. Beck he made a geological survey of Albany and Rensselaer counties. In 1820, he was professor of natural history in the medical college at Castleton, Vt. In 1824, he was at the head of the Rensselaer school of science in Troy. He published many works on botany, chemistry, geology, natural history, and agriculture.

EATON, Amos B., b. N. Y., 1806; graduated at West Point in 1826, and entered the army as officer of infantry. After service on the northern frontier, he was transferred, in 1838, to the department of subsistence, and served as commissary in Florida, on the Canada border, and in New York. In the Mexican war, he was chief commissary under maj.gen. Taylor, and in 1851–55 he was in the department of the Pacific. During the war of the rebellion he was depot commissary at New York city, and purchasing commissary stores for the armies in the field, and after 1864, head of the commissary bureau at Washington. He was made brevet maj.gen. for faithful, meritorious, and distinguished services.

EATON, George W., D.D., LL.D., 1804–72; b. Penn.; a Baptist minister, educated in Ohio university and Union college, and tutor in the last named institution in 1829. In 1831, he was professor of ancient languages in Georgetown (Ky.) college; 1832–50, professor of mathematics, natural philosophy, and ecclesiastical and civil history in the literary and theological institution at Hamilton, N. Y.; afterwards at the same place professor of systematic theology; 1856–68, president of Madison university; also, 1861–71, president of the theological institution.

EATON, John, Jr., PH. D., b. N. H., 1829; graduated at Dartmouth in 1854, studied theology at Andover theological seminary; ordained by the Maumee (O.) presbytery, 1861; commissioned chaplain of the 27th Ohio volunteers, 1861; appointed by gen. Grant superintendent of contrabrands, 1862; general superintendent of freedmen for Mississippi, Arkansas, w. Tennessee, n. Louisiana, 1862, serving till May, 1865. He was commissioned col. of the 63d colored troops, 1863; breveted brig.gen. of volunteers, 1865; assistant commissioner of the bureau of refugees, freedmen, and abandoned lands, 1865; state superintendent of public instruction for Tennessee, 1867–69; and U. S. commissioner of education, 1870. He has published many reports, chiefly upon education and the public affairs in which he participated; and established and edited, 1866–70, the Memphis *Daily Post*.

EATON, William, 1764–1811; b. Conn.; at 16 years of age, entered the revolutionary army and served through the war. Entering Dartmouth college, he graduated in 1790, and in 1792 was made a capt. in the regular army; in 1797, sent as diplomatic agent to Tunis, where he succeeded in putting an end to the outrages of the corsairs of that country upon American ships. In 1803, he returned, but the next year went back as navy agent of our government for the Barbary states. There was at the time a contest for the throne of Tripoli, with which country this nation was at war. Eaton found that the rightful bey, or ruler, had taken refuge in Egypt. He went to him, assisted in raising a force of 500 men, marched 600 m. over the Libyan desert, secured the assistance of the American fleet, and captured Derne after a furious assault, in which he was wounded. The reigning bey came against him, and desultory warfare followed. June 11, 1804, a general engagement took place, and the usurping bey was defeated. Eaton was about to march to Tripoli, install the rightful ruler, and release a large number of American captives, when news arrived that peace with Tripoli had been concluded by the American consul at Algiers. This put an end to his work, and he returned home. He settled in Massachusetts; the legislature of that state gave him 10,000 acres of land. Later, he was himself elected to the legislature. In 1806, Aaron Burr tried to engage him in the south-western conspiracy, but without success, and on Burr's trial Eaton was a witness against him.

EAU CLAIRE, a co. in w. Wisconsin, on Chippewa and Eau Claire rivers, reached by the Chicago, St. Paul, and Minnesota, the Chippewa Falls and Western, and the West Wisconsin division of the Milwaukee and St. Paul railroad; 648 sq.m.; pop. '75, 15,991. The surface is uneven, and the soil fertile; principal productions, wheat, corn, oats, and butter. Co. seat, Eau Claire.

EAU CLAIRE, a city and seat of justice of Eau Claire co., Wis., at the junction of the Eau Claire and Chippewa rivers, and at the head of steam-boat navigation on the latter; on the West Wisconsin railroad, 88 m. from St. Paul; pop. '75, 8,440. With its suburbs of West and North Eau Claire, it is the chief commercial point in n.w. Wisconsin. It is the outlet of the Chippewa lumber district; has good water-power from both streams, with opportunities for the safe storage of large quantities of logs, and manufactures about 300,000,000 ft. of lumber annually.

EAU DE COLOGNE, a celebrated perfume, invented long ago by the Farina family in Cologne, and since manufactured chiefly by members of the same family. It is also made in France. It consists principally of spirits of wine, along with numerous essential oils harmoniously mingled together, so as to produce a refreshing and grateful scent. The recipe said to be followed in the manufactories at Cologne is twelve drops of each of the essential oils neroli, citron, bergamot, orange, and rosemary, along with one dram of Malabar cardamoms, and one gallon rectified spirit. The whole is distilled together, and the condensed liquid constitutes Eau de Cologne.

EAU CRÉOLE, a very fine liqueur, made in Martinique, by distilling the flowers of the mammee apple (*mammea Americana*) with spirit of wine.

EAU DE JAVELLE is a solution of hypochlorite of potash, which, when administered to man, is stated to act powerfully on the nervous system, and to give rise to general rigidity, and even to cause tetanic spasms.

EAU DE LUCE is the name given to a preparation which was formerly a very popular stimulant, and is still occasionally used. It is a mixture of oil of amber with alcohol and ammonia, and has a milky appearance. It had a great reputation in cases of snake-bites.

EAU DE VIE. See BRANDY.

EAUX BONNES, a fashionable watering-place of France, in the department of Basses-Pyrenees, is situated 20 m. s.s.e. of Oloron. It stands in a narrow gorge surrounded with rocks, and consists of a street of about 30 large and well-built hotels and lodging-houses. On the opposite side of the street there is an open space laid out as a shrubbery and planted with trees; it is called the Jardin Anglais. E. B. is much frequented on account of its hot sulphureous springs, which are four in number, and are used for bathing purposes. Their temperature does not exceed 91° F. There is also a cold spring here, which is used for drinking. The springs are said to be very valuable, on account of their power of checking the progress of incipient consumption, and of curing various affections of the lungs and chest. The season of the E. B. lasts from June to Oct., and during that time it is crowded with visitors and patients.

EAUX CHAUDES, LES, 3 m. s.w. of the preceding, is a similar place of resort. Its springs have the same properties as those of the Eaux Bonnes.

EAVES, in architecture, the edge of a sloping roof which overhangs the wall, for the purpose of throwing off the water. When there is no concealed gutter at the margin to conduct the water to spouts or pipes, but the water is allowed to run from the roof to the ground, they are called *dripping eaves*.

EAVESDRIP, or EAVESDROP (Ang.-Sax. *yfesdrype*). "The owner of a private estate," says Kemble (*Saxons in England*, vol. i. p. 45), "was not allowed to build or cultivate to the extremity of his own possession, but must leave a space for eaves. The name for this custom was *yfesdrype*." The space was regulated by the charter by which the property was held. In a charter of 868 A.D., it is limited to 2 feet. This Saxon custom corresponded to the well-known urban servitude of the Romans called stillicide (*stillicidium*). The eavesdrop was the water which dropped from the projecting roof, and in this sense is opposed to the water collected in a spout, to which the Romans gave the name of *flumen*. Similar regulations existed in Greece, and have probably existed in all countries.

EAVES-DROPPERS "are such as listen under walls or windows, or the eaves of houses, to hearken after discourse, and thereupon to frame slanderous or mischievous tales."—Blackstone's *Comm.* iv. 168. Such persons are, by the law of England, regarded as common nuisances: they may be indicted at the sessions, and on conviction are punishable by fine. Persons who by their conduct expose themselves to suspicion of an intention to commit this offense, may be brought before a magistrate, and required to give security for their good behavior; 34 Edw. III. c. 1. See Hawk., P. C., I. 62, sec. 4.

EBAL AND GERIZIM. See GERIZIM and EBAL, *ante*.

EBB AND FLOW. See TIDES.

E'BELING, CHRISTOPH DANIEL, 1741–1817; b. Hanover. He was famous for extensive knowledge of oriental languages, classic literature, and geography and history. The congress of the United States gave him a vote of thanks for his *History and Geography of North America*. He made a collection of about 4000 books and 10,000 maps relating to America, which is now in the library of Harvard university.

EBENA'CEÆ, a natural order of exogenous plants, consisting of trees and shrubs, with alternate leathery leaves, and axillary flowers, which are monopetalous, somewhat leathery, and generally unisexual; the fruit fleshy. They have not a milky juice. They are regarded as allied to *aquifoliaceæ* (holly, etc.), *apocynaceæ*, and *oleaceæ*. About 160 species are known, mostly tropical, but a few are natives of Europe, and other temperate countries. The wood is in general remarkable for its hardness, as the different kinds of ebony (q.v.) and other species of *diospyros;* and on account of this quality, even that of species which never attain the ordinary size of timber trees is sometimes

accounted valuable, as of *royena lucida*, the African bladder-nut or zwart-bast, at the cape of Good Hope; where also that of *euclea undulata*, a hard brown wood, is esteemed for cabinet-work. The fruit of many species is eatable. See DATE PLUM. The fruit of *embryopteris gelatinifera* contains a viscid juice, and is used in all parts of India for paying boats.

EBENE'ZER, the name of a place marked by a monumental stone set up by Samuel in recognition of divine assistance in a battle with the Philistines. Its location cannot be satisfactorily determined. The name means "Stone of the help."

EB'ERHARD, AUG. GOTTLOB, a well-known German author, was b. at Belzig, in 1769, studied at Leipsic and Halle, and first attracted attention by his contributions to a periodical devoted to *belles-lettres*, entitled *Ida's Blumenkörbchen* (Ida's Flower-basket). Among his numerous works may be mentioned *List um List, oder was ein Kuss nicht vermag* (Trick for Trick, or what could not a Kiss do); *Ysop Lafleur's Sämmtliche Werke* (Ysop Lafleur's Collected Works); *Ferdinand Werner, der Arme Flötenspieler* (Ferdinand Werner, the poor Flute-player); and *Ischarioth Krall's Lehren und Thaten* (Iscariot Krall's Doctrines and Doings); *Hannchen und die Küchlein* (Jenny and the Chickens), a narrative poem in ten parts, which has gone through many editions, and been often translated into other languages; and *Der erste Mensch und die Erde* (The First Man and the Earth), a poem marked by simple dignity and lively representation. E., after a life of hard literary work, died at Dresden, 13th May, 1845.

EB'ERHARD, IM BART (Ger., with the beard), Count, and afterwards first duke of Würtemberg; 1445–96; the second son of count Ludwig I. He succeeded his elder brother, Ludwig II., at the age of 12, and before he was 14 wrested the government from his uncle Ulrich, who had been appointed his guardian. His tutor was the learned John Nauclerus, but Eberhard profited little by his learning, indulged his passions, and led a dissipated life. In 1468, he made a pilgrimage to Jerusalem, after which he abandoned his reckless mode of living, and became one of the most popular princes of Germany. He married Barbara, daughter of Lodovico di Gonzaga, whose influence over him contributed largely to the elevation of his character. He began to study, gathering around him men of learning; and at the solicitation of his wife founded in 1477 the university of Tübingen. In 1482, Eberhard, by the treaty of Minzingen, put an end to the evils which had arisen from a division of the county made in 1437 between his father and his uncle Ulrich, as representatives of the two lines of Urach and Stuttgart. By this treaty he secured the future indivisibility of Würtemberg and the right of primogeniture in his own family; he became at the same time the founder of the representative constitution of Würtemberg. He made Stuttgart his place of residence, and improved the laws and condition of the convents in his country. Though a lover of peace, he knew how to bear the sword when war was necessary; and by his courage and fidelity to his engagements secured the esteem and friendship of the emperors Frederick III. and Maximilian I. In recognition of his services, the emperor at his first diet, held at Worms in 1495, raised Eberhard to the dignity of duke, confirming at the same time all the possessions and prerogatives of his house; but Eberhard did not long enjoy his new dignity. His two children died in infancy, and with his death the line of Urach became extinct.

EBERHARD, JOHANN AUGUST, a philosophical writer of Germany, was b. at Halberstadt, 31st Aug., 1739; studied theology at Halle, 1756–59; and after spending several years as a preacher in Berlin and Charlottenburg, became professor of philosophy at Halle in 1778, and doctor of theology in 1808. He died 6th Jan., 1809. E.'s first work was his *Neue Apologie des Socrates* (New Apology of Socrates), 2 vols., Berlin, 1772; a work in which the rights of common sense are vindicated against the accusations of a narrow theology. It was received with much applause both in Germany and in other countries. Among his other writings may be mentioned *Sittenlehre der Vernunft* (Ethics of the Reason), Berlin, 1781; *Theorie der schönen Künste und Wissenschaften* (Theory of the Fine Arts and Sciences), Halle, 1783; *Allegemeine Geschichte der Philosophie* (Universal History of Philosophy), Halle, 1788; *Handbuch der Aesthetik* (Manual of Æsthetics), 4 vols., Halle, 1803–5; and *Versuche iner allegemeinen Deutschen Synonymik* (An Attempt towards a Complete Work on German Synonyms), 6 vols., Halle, 1795–1802, a work which was enriched and improved by Maas, 1818–21, and again by Gruber, 1826–30, but which was, at the time of its appearance, the best thing of the kind in the German language. Towards the close of his life, E. struggled, but without success, against the speculative excesses of the new schools of philosophy headed by Kant and Fichte. E. was a clear and sensible thinker, as well as an agreeable and interesting writer.

EB'ERHARD, KONRAD, 1768–1859; b. Bavaria; studied in Munich and Rome; sculptor and painter; became professor of sculpture in the Munich academy of fine arts. Many of his paintings illustrate the progress and triumphs of Christianity. Of his sculptures, the best known are the statues of St. Michael and St. George at the Isargate, Munich; and the tomb of the princess Caroline.

E'BERNBURG, a small t. in the Bavarian palatinate, is situated about 20 m. s.w. of Mayence, at the junction of the Alsenz with the Nahe. It is notable on account of the ruins of its castle, which formerly belonged to the famous knight Franz of Sickingen,

who was a devoted friend of the early reformers. His stronghold, which was once considered almost impregnable, afforded a secure retreat from danger and persecution to Melancthon, Bucer, Œcolampadius, and Ulrich von Hutten, the last of whom composed several of his works here. After the death of Sickingen, the castle of E. was besieged and dismantled by the electors of Hesse and Treves. Pop. about 500.

E'BERS, GEORG MORITZ, b. Berlin, 1837; studied at Gottingen and Berlin, and taught in the university of Jena. He has paid especial attention to Egyptian archæology, and has published *The Egyptian King's Daughter*, a description of the subjugation of Egypt by the Persians, in the form of a historical novel; *Egypt and the Books of Moses; Through Goshen to Sinai;* etc.

EBERT, KARL EGON, a Bohemian poet, was b. at Prague, 5th June, 1801; was educated there and at Vienna; and after filling several situations, settled in Prague. The honor of knighthood was conferred on him in 1871. His chief works are his *Dichtungen* (2 vols., 1824; 3d ed., 1845); *Wlasta, ein Böhmisch-nationales Heldengedicht in drei Büchern* (Wlasta, a Bohemian National Heroic Poem, in three books), Prag. 1829; and *Das Kloster, idyllische Erzählung in fünf Gesängen* (The Cloister, a Narrative Idyll, in five cantos), Stutt. 1833. These poems, especially the last two, are marked by lyrical vehemence, and elegance of language. They were received with applause, particularly in Bohemia, whose national traditions form their ground-work. E.'s compositions show a happy union of the German and Czech characteristics. He has also written a large number of dramas, of which *Das Gelübde* (The Vow) (1864) was received with public favor at Prague. He has also published some meritorious lyrical poetry.

E'BIONITES (Heb. *ebion*, poor), a name probably given originally by the hierarchical or influential party among the Jews, to those of their countrymen who professed the Christian faith, and who generally belonged to the *poorer* and more ignorant class (John, chap. vii., verses 48, 49). Subsequently, it would seem, the Gentile Christians, who were ignorant of Hebrew, employed it in a distinctive sense to designate their Jewish co-religionists, who, in addition to their belief of Christianity, observed the Mosaic law. Irenæus is the first writer who makes use of the name. It is highly probable that the E. first became an organized body or sect at Pella, a city in Peræa, on the eastern side of the Jordan, whither they had betaken themselves on the breaking out of the Roman-Jewish war in the time of Hadrian. Here, indeed, a strictly Jewish-Christian church continued to exist down to the 5th century. Among the E., however, there was by no means a unanimity of religious feeling, or uniformity of opinion. Two great divergent parties are clearly recognizable—the E. proper, and the Ebionitic Nazarenes. The former were little different from Jews: their conceptions of the Saviour were meager and unspiritual. They believed that Jesus was simply a man distinguished above all others for *legal* piety—pre-eminently a *Jew*, and selected as the Messiah because of his superior Judaism. Of course they denied his supernatural birth, yet not his resurrection, for "they lived in expectation of his speedy return to restore this city of God (Jerusalem), and to re-establish the theocracy there in surpassing splendor."—Neander. They were the genuine descendants of those Judaizers who plagued the church in the time of the apostle Paul. The Ebionitic Nazarenes, on the other hand (who at the close of the 4th c. seem to have dwelt chiefly about Berœa in Lower Syria, but at an earlier period may have been more widely diffused), were Jewish Christians, in the better sense of the term. They conceived it to be their *own* duty still to circumcise, keep the Sabbath, etc., but they had no wish to impose the peculiarities of Judaism on the Gentile Christians. They did not believe that Christianity was merely a glorification of Judaism, but a new life come into the world, in which the Gentile might at once participate, without undergoing a Mosaic ordeal. Like the stricter E., they used a *Gospel of Matthew;* but it contained what the other did not—an account of the supernatural conception and birth of the Saviour. According to Neander, who has very thoroughly investigated this question, there were a great many varieties of opinion among the E., springing out of the differences above spoken of, which it would be tedious to record. It is sufficient to say that *Essenism* (q.v.) modified Ebionism greatly, through the introduction of a Jewish mysticism, which recognized in Moses and Christ an inward identity of doctrine, and regarded them as revealers of the "primal religion," whose teaching, however, had been sadly corrupted. It is extremely probable that an Essenic Ebionite wrote the *Clementine Homilies.* See CLEMENS.

EB'OLI (ancient *Eburi*), a small t. of southern Italy, in the Principato Citeriore, about 16 m. e.s.e. from Salerno, is picturesquely situated at a considerable elevation above sea-level. The climate, which does not become too cold in winter, notwithstanding the position of the town, is very unhealthy in summer, owing to the number of streams in the neighborhood. There is an annual fair at E. which lasts 12 days. Pop. 7,300.

EB'OLI, ANNA DE MENDOZA, Princess of, daughter of a viceroy of Peru at the court of Philip II. of Spain in the 16th century. She was famous for her intrigues, fascinating the king, the secretary of foreign affairs, and other great men. She was charged with being implicated in the murder of Escobedo, the envoy of Don John of Austria.

EBONY (Lat. *ebenum;* but originally from the eastern name), a wood remarkable for its hardness, heaviness, and deep black color, is the heart-wood of different species of

diospyros, of the natural order *ebenaceæ*, the same genus which produces the date plum (q.v.), kaki, and other fruits. The best E., excelling in uniformity and intensity of color, is the produce of *D. ebenum*, which grows in great abundance in some of the flat parts of Ceylon, and is a tree of such magnitude, that logs of its heart-wood, 2 ft. in diameter, and varying from 10 to 15 ft. in length, are easily procured. *D. melanoxylon*, the E. tree of Coromandel, yields E. of good quality; *D. tomentosa*, *D. roylei*, and other Indian species, also yield it. In Mauritius and Madagascar, E. of very good quality is produced by *D. reticulata*. Other species of *diospyros* are much valued for their beautiful timber, very different in color from E., as calamander wood (q.v.) and cadooberia (*diospyros ebenaster*). The last-named species is found in India and Ceylon. The prevailing black of the wood is beautifully striped with a rich yellowish-brown; but in density and durability it is far inferior to ebony.—E. is chiefly used by cabinet-makers for veneering. The ancient Greeks and Romans were acquainted with it; and it is supposed that they obtained it either from India or Madagascar. They frequently inlaid it with ivory, for contrast of color. It is mentioned by Ezekiel (xxvii. 15) as an article of Tyrian commerce. It was at one time used in medicine, as a laxative and sudorific; it has a somewhat pungent taste.—The name E. is sometimes given to the black wood of trees very different from those of the genus *diospyros*. An Abyssinian tree called mozzungha (*fornasinia*), of the order *leguminosæ*, produces a black heavy wood, much resembling ebony.—West Indian E. or American E., is produced by *brya ebenus*, also of a natural order *leguminosæ*, but the wood is of a greenish-brown rather than a black color. It receives a good polish, is very hard and durable, and much sought after by musical-instrument makers. It is one of the articles of export from the West Indies to Britain. But the tree is of small size, seldom more than 12 ft. high, and the trunk only a few inches in diameter.

E'BRO (Lat. *Iberus*), an important river of Spain, rises in the province of Santander, at a point greatly elevated above the level of the sea, about 12 m. n.w. of Reynosa, flows s.e. for about 25 m.; then e. past Frias, after which it maintains a general s.e. course, passing Miranda, Haro, Logroño, Tudela, and Zaragoza, when it turns n., passes Mequinenza, flows s.e. to Mora, s. to Tortosa, and finally e. to the Mediterranean, into which it falls after a course of about 540 miles. Its mouth is choked up with sand, and, to render it navigable, a canal called the San Carlos has been carried through the delta. Its principal affluents are the Najerilla, Jiloca, and Guadalope from the right, and the Aragon, Gallego, and Segre from the left. The course of the E. is chiefly through narrow, and sometimes rocky valleys; and its bed is characterized by many shoals and rapids which interrupt the navigation. This is partly remedied, however, by means of the Imperial canal, which extends from the vicinity of Tudela to a point 40 m. below Zaragoza.

EBULLIOSCOPE, an instrument for ascertaining the strength of distilled liquors by observing the boiling point and the atmospheric pressure.

ÉCARTÉ, a game at cards, probably first played early in the present century in Paris, though it appears to have grown out of an old game called *la triomphe*, or French-ruff. It is usually played by two persons, though sometimes by three, the third player taking the place of the loser in the first game, and the pool not being taken except by the winner of two games in succession. In French écarté, bystanders are permitted to advise, and the player losing leaves the table, his adviser taking his place. If, however, the loser is playing *la chouette* (i.e., taking all bets offered), he need not retire on losing. The small cards are removed from a pack, and the player cutting highest deals. He gives five cards, by two and three at a time, to his opponent and himself, and turns up the eleventh card for trumps. The trump card, if a king, counts one for the dealer. His adversary, if satisfied with his hand, plays; if not satisfied, proposes, and the dealer can accept or refuse. Should he accept, each may discard, face downward, as many cards as he may choose, receiving fresh ones from the cards yet undealt, these being given first to the non-dealer, till his hand is complete. A second proposal and a third may be made, and so on till the player is satisfied; but if the dealer refuse, the hand must be played without discarding. The king of trumps scores one if in either hand. The non-dealer being satisfied with his hand, leads; the dealer follows; and the trick is taken by the highest card, or the trump. The king is the highest. The winner of a trick leads to the next. The second player must follow suit, and must win the trick if he can. The game is scored by the king, as explained, and the majority of tricks. Three tricks score one for the point; all five tricks won by one player score two for the *vole*. When the non-dealer does not propose, or his proposal is refused, and he fails to gain three tricks, the dealer scores two, but no more even though he win the *vole*. The game is five up.

ECBATA'NA (Agbatana, Achmĕta, Hagmatana), the ancient capital of Media, situated at a distance of 12 stadia (about 1½ m. from Mt. Orontes, the modern Elwend. Its foundation was attributed by popular belief to Solomon or Semiramis, while the book of Judith ascribes it to Arphaxad (Phraortes?), and Herodotus to Deioces (728 B C.). It lay upon a conical hill, crowned by a temple of the sun, and was inclosed by seven concentric walls, the innermost of which was gilded, and the next plated with silver; while the rest, in their order outwards, were painted orange, blue, scarlet, black, and white, respectively. As they rose in gradation towards the center, all the battlements

with their gorgeous hues—probably representing, in Sabæan fashion, the seven planetary spheres or the seven climes—were visible at once. The city is reported to have been 250 stadia in circumference. Its principal buildings were the citadel—a stronghold of enormous dimensions, where also the archives were kept, in which Darius found the edict of Cyrus the great concerning the rebuilding of the temple in Jerusalem—and the royal palace. Cedar and cypress only were used for the woodwork, and the ceilings, beams, and rafters were overlaid with gold and silver. The mild climate and the magnificence of its structure singled out E. as the favorite summer residence, first of the Median, then of the Persian, and, lastly, of the Parthian monarchs. After the battle of Arbela (331 B.C.), Alexander followed Darius thither, and secured an immense booty. It was again pillaged by the Seleucidæ; but such were the riches of this place, that Antiochus the great still found 4,000 talents' worth of silver to carry away. E. subsequently fell into the hands of the Parthians; and it has since so utterly sunk into decay, that notwithstanding the frequent mention that is made of it both in the Bible and in classical writings, its very site can no longer be fixed with certainty. Gibbon and Jones tried to identify it with Tabriz or Tauriz; Williams, with Ispahan; while recent explorers, such as Rennell, Mannert, Kinneir, Morier, and Ker Porter, generally agree that the present Hamadan, with the supposed tombs of Mordechai and Esther (see HAMADAN), occupies the site of ancient Ecbatana. Sir Henry Rawlinson assumes two Ecbatanas, one the present Hamadan, the other the present Takhti-Suleiman, 36° 25 n. lat., 47° 10′ w. long. Both the orthography of the scriptural Achmĕta, and the cuneiform Hagmatana in the Behistun inscriptions, which, by changing the *m* into *b*, became Agbatana in Greek, seem to point to Hamadan. Broken columns, a few cuneiform inscriptions, coins, medals, and a fragmentary stone lion, placed there, according to the Eastern legend, by the sorcerer Apollonius of Thyane, at the command of Nebuchadnezzar, in order to guard the town from excessive cold and snow—all dug out near Hamadan—are all that now remains of that once most royal of cities. There was another ECBATANA in Persis, which was given to the Magi; and a third in Syria, at the foot of Carmel, the present Kaïffa, where Cambyses, the son of Cyrus, suddenly died 520 B.C.

ECCALEO'BION, an oven for hatching eggs. The eggs are placed on shelves one above the other, so fixed that the eggs can be turned over once in a day or two. The proper temperature is provided by steam or warm water. Artificial hatching was one of the most ancient inventions of Egypt. Perhaps the idea was taken from the hatching of eggs in the hot sand of that country.

ECCARD, JOHANNES, 1553–1611; b. Prussia; a composer of church music. He was a pupil of Orlando Lasso, at Munich. In 1583, he became assistant conductor, and in 1595, chapel-master, at Konigsberg. In 1608, he was chief conductor of the elector's chapel in Berlin, where he died. His works are songs, sacred cantatas, and chorales. He set to music the great national hymn of the Germans, *A Mighty Fortress is our God*, (Luther's *Ein feste Burg ist unser Gott*). Many collections of his songs are extant.

ECCE HOMO (Lat. "Behold the man"), the name usually given by artists to paintings representing Christ bound and crowned with thorns previous to his being led forth to crucifixion. On this exalted subject the highest efforts of art have been employed. The finest "Ecce Home" is that of Correggio, in the National Gallery, London; the whole conception of this remarkable picture being of the first order of genius. Other conceptions have been painted, such as that of Guido. See Dr. Waagen's *Art and Artists in England*.

ECCENTRIC, in machinery, is a contrivance for taking an alternating rectilinear motion from a revolving shaft. It consists of a circular disk or pulley, fixed on a shaft or axis which does *not* pass through the center of the disk. The disk has a groove upon its circumference in which the hoop—by means of which the rod is attached to the disk—slides. As the eccentric revolves with the axis, the hoop is alternately raised and lowered, and with it the rod which is keyed into it. The extent of the rise and fall of the rod is equal to twice the distance between the centers. The E. is chiefly used where a subsidiary motion of small power is required; as for working the force-pump that supplies the boiler of a steam-engine (q.v.).

ECCENTRIC, or ECCENTRIC CIRCLE (in the Ptolemaic astronomy). It was a fundamental doctrine with the ancient astronomers, that every heavenly body moved in a circle (the perfect figure), and at a uniform rate. To move otherwise than uniformly and in the perfect figure, would have been unbecoming a heavenly body! But some of them appeared to misbehave by moving unsteadily, and in other figures than circles. Of course, this was a mere deceptive appearance; but then, to save the fundamental doctrine, it must be explained. To explain it, they invented the *eccentric* circle. Suppose a body, such as the sun, to move in a circle at a uniform rate, and a spectator to observe it, not from the center of the circle, but from a point half way between the center and the circumference. Then it is evident that, by hypothesis, to an observer at the center of the circle, the motion of the sun is uniform; i.e., the sun travels through equal angular distances in equal times. When, however, the observer is located at the second point, the angular distances traveled through in equal times are unequal. If, then, the earth, instead of being at the center of the sun's orbit, be in a position away

from it, the want of regularity in his movements will be explained. Accordingly, to reconcile the observed fact with the fundamental doctrine, the ancients placed the earth at a point away from the center of the sun's supposed orbit. Hence this orbit was called the *eccentric*, in respect that its center did not coincide with that of the earth, which was considered as the center of the universe.

ECCENTRICITY. In the ellipse and hyperbola (q.v.), the E. is the ratio of half the distance between the foci to the semi-major axis. In older mathematical works, E. is sometimes used as the name of half the distance between the foci of an ellipse or hyperbola.

ECCHELLENSIS, or ECHELLENSIS, ABRAHAM, b. Syria, near the close of the 16th c.; educated in the Maronite college in Rome, and professor of Arabic and Syriac in the college of the Propagandists. In Paris, he assisted in the preparation of Le Jay's Polyglot Bible. He published several Latin translations of Arabic works, and was engaged in a controversy with Selden as to the historical grounds of episcopacy.

ECCHYMO'SIS (Gr. from *ek*, out of, and *chymos*, juice), a discoloration of the surface, produced by blood effused below, or in the texture of, the skin. It is usually attended by swelling to a greater or less extent, and is the result of injury. The presence of E. is sometimes adduced in courts of law as a proof of violent injuries having been inflicted during life, or very shortly after death. A question with respect to this was raised in the celebrated case of Burke and Hare, the West Port murderers in Edinburgh. E. may sometimes be diminished by applying cold cloths or a bladder of ice to the surface, in the case of injuries quite recently inflicted.

EC'CLESFIELD, a township in the West Riding of Yorkshire, 5 m. n. of Sheffield. Pop. '71, 15,171. The chief manufacture is cutlery, but flax, linen, and nails are also branches of industry. There are coal and iron mines in the vicinity.

ECCLE'SIA. I. The great assembly of the Athenians in which all free citizens might vote. Its authority was supreme, but, as in the growing power of the higher classes it was after a time seldom convened, the entire management of the state fell into the hands of the archons, who were chosen from the aristocratic classes. Solon (B.C. 594) ordained that it should meet monthly, on established days, and at other times when emergencies arose. It was convened by the *prytanes*, was presided over by the *epistates*, and, after it had been constituted by the offering of sacrifice and prayer, the *proedroi* announced the subjects for consideration, which had already been acted on by the senate, but required the consent of the people before they could become laws. Citizens who were over 50 years of age were first invited to speak; afterwards any one over 30 might be heard. The voting was by stretching forth the hands, or by depositing beans and stones in vessels prepared for them. When the business had been finished the prytanes dismissed the E. In Sparta, also, there were assemblies of the same name. One kind, composed only of citizens of Sparta itself, was called the little E. It met once a month, at first in the open air and afterwards in a building erected for the purpose. Any citizen over 30 years of age might speak. Another kind, called by way of eminence the E., was composed of the kings, senators, magistrates, and delegates from all the towns and cities of the province of Laconia. It had cognizance of all affairs of common interest and importance to the whole state. The voting at Sparta was by acclamation, and not by ballot. The majority was determined by the comparative volume of sound, or, if that was doubted, by a division and counting of the two parties. II. In the Greek of the New Testament, E. is the name for the company of Christ's disciples professing to trust in him as their Saviour and to obey him as their Lord. It is applied to a small assembly of them, such as were members of one family, or could meet in a dwelling-house of ordinary size; to the whole number in one city or neighborhood; to the whole number on earth; to all that are in heaven; and to the innumerable company on the earth and in the heavens.

ECCLESIAS'TES (Eng. the Preacher), the title (taken from the Septuagint) of a canonical book of the Old Testament; its Hebrew name is *Koheleth*, which signifies nearly the same. The inscription with which it commences is: "The words of Koheleth, the son of David, king in Jerusalem." Its authorship is commonly ascribed to Solomon. In support of this opinion, however, there is not a vestige of internal evidence except what arises from the dramatic use of his name, an expedient in all probability resorted to by the writer to give force and emphasis to his own reflections, inasmuch as Solomon was held by the Jews to be the perfection of human wisdom. The first who doubted the Solomonian authorship of the book was Grotius. Later critics have advanced further than Grotius. The actual writer probably flourished, according to Dr. Davidson, in the later period of the Persian government, not long after the time of Malachi, i.e., 350–340 B.C. Such is also substantially the opinion of Rosenmüller, Knobel, Ewald, and De Wette. Hengstenberg, unquestionably the ablest critic of the orthodox German school, considers that the contents of the book may best be explained by supposing the author to have lived in a period like that of Malachi, in which there prevailed a pharisaical self-righteousness, and melancholy murmurings against the providence of God. The dates assigned to it by Hartmann (viz., the period of the Maccabees) and by Hitzig (204 B.C.)

cannot well be sustained, as there is no trace in the book either of Grecian philosophy or language.

The chief arguments against the Solomonian authorship are *three*. 1. The writer indicates unconsciously his own posteriority in point of time by making Solomon say: "I *was* king over Israel in Jerusalem" (chap. i. verse 12); a thing which Solomon could *not* have said during his life, for he was king to the end of it. 2. The condition of the country in the time of the writer, the oppression, judicial injustice, the elevation of fools and slaves to high offices, etc., do not fit the reign of Solomon at all, nor any preceding period. 3. The language is post-exilian. Ewald, the greatest of recent orientalists, asserts that "the Hebrew is so strongly penetrated with Aramæan, that not only single often-recurring words are entirely Aramæan, but the foreign influence is infused into the finest veins of the language."—(Dr. Davidson in vol. ii. of Horne's *Introduction to the Holy Scripture.*)

It is extremely difficult to ascertain the stand-point of the author. He is deeply convinced that "all is vanity and vexation of spirit," but whether this conviction springs wholly from a religious view of life, or is in part caused by personal disappointments, we have not sufficient internal evidence to determine. There is much in E. that, if it stood by itself, might be thought to be a mere product of cynical epicureanism, but it is mixed up with so much that is nobler, with a faith in God that rises high above the crushing considerations of the vanity of all mortal life, and the book terminates so grandly, that it seems more reasonable to believe that the aim or intention of the writer was moral and religious, and not cynical; that he painted the folly, weakness, and helplessness of men in such strong colors, only that he might destroy their self-righteousness, and cure them of that inability to read the laws of God, which self-righteousness always produces. For what is the conclusion of the whole matter? "Fear God, and keep his commandments: for this is the whole duty of man."

ECCLESIAS'TES, Book of, consists of an introduction, a main body, and a conclusion. The introduction announces the theme that all things beneath the sun, if pursued as in themselves the chief end of man, and without reference to God and to immortality, are utterly vain. Man in such a pursuit, with all his high faculties, has less value and power than pertain to unconscious nature, for while it abideth he is quickly cut off; natural objects depart and return, in endless circuit, but man's life comes to an end and he is no more. The main body of the book establishes this proposition not by abstract reasoning, but by appeal to the actual experience of the human heart; and not among the poor, lowly, and ignorant, but among the wise, exalted, and rich. At the head of this class, in a Jew's esteem, would be the kings in Jerusalem, and among them all Solomon was most exalted. He, therefore, is introduced as revealing the feelings of his heart in the midst of his wisdom, wealth, and power. He had tried wisdom, pleasure, and every form of great achievement, and had found them vanity. Yet, by bringing God and the soul into the account, measures of happiness may be enjoyed. These the book proceeds to declare: 1. Happiness is attainable here in the enjoyment of the food which sustains life, and of labor as it is performed. But even this, man cannot secure by his own efforts alone. It must be the gift of God. He will bestow wisdom, knowledge, and joy on those who are good in his sight; but the activity and energy of sinners he will make advantageous to others rather than to themselves. 2. Riches, even when obtained through toil, cannot in themselves give happiness; for all enjoyment of the food which sustains life, and of the wealth which crowns it, is the gift of God, and from him must the rich obtain it, on the conditions which he prescribes, and in the measures which he bestows, or vanity and vexation will fill their souls. 3. As there are many circumstances of life in which wealth has no power to give happiness, as it is often lost after it has been acquired, and as many persons never possess it, happiness is to be found in the enjoyment of the food which sustains life, and in the possession of joy *in the soul*, independently of circumstances, whether of wealth or poverty, of success or failure, of obscurity or fame. This only can abide with man amidst all changes; and this, God who created the soul, and he only can supply. 4. Life, whatever its circumstances and experiences, comes to one inevitable end, in which all that is material shall return to the earth, and the spirit, the great gift of God, shall return to him. Preparation for this end, therefore, is the great object of life. If it be rightly made, life is a grand success, whatever its circumstances and transient experiences may be; if it be not made, life is an awful failure, whatever honor, wealth, or pleasure may have been secured. While these four propositions, linked together, are the golden thread which runs through the book, many particulars, drawn from personal observation and experience, are grouped around them. Some of these may be readily comprehended by any thoughtful mind; others, many persons can scarcely, if at all, understand. But this difficulty shows that the book is true to life; for while much of human experience is common to all men, and may therefore be understood by all, in other parts of it each heart knows its own bitterness and a stranger does not intermeddle with its joy. Every human soul, in its progress from folly to wisdom, or on its way back from transgression to righteousness, passes through phases of inconsistency, darkness, doubt, mystery, and wickedness, which, if faithfully recorded, would be incomprehensible to other minds. It is possible that some of the confusion which many find in the details of Ecclesiastes, is

of this sort. The conclusion of the book, repeating the declaration that human life, when pursued as if it contained within itself its highest end, is the vainest of vain things, adds a single rule for its guidance in all circumstances and in every age. The fear of God, securing obedience to his commandments in view of his appointed judgment to come, is all that is requisite to insure the righteousness, peace, and welfare of man.

Since the time of Luther, continental critics generally, including many who do not question the canonical authority of Ecclesiastes, have ascribed the authorship of it to some unknown writer who lived between B.C. 536 and 150, and, as they suppose, introduced Solomon as revealing his own experience and speaking as a representative of mankind. The reasons assigned for their opinion are: 1. That the book is written in Hebrew of a much later age than Solomon's, and contains many Aramaic words; 2. That many parts of the subject matter are not such as Solomon would have written. On the other hand, Jewish tradition from the earliest times has attributed the book to Solomon, saying that he wrote the song of songs in his youth, the proverbs in middle life, and Ecclesiastes in old age. Some modern scholars, whose thorough knowledge of Hebrew is unquestioned, stand resolutely by Jewish tradition; and some, who, perhaps, are not Hebrew scholars, are bold enough to say that since Solomon, in his later years, had constant conversation with foreign women, he may have corrupted his language with foreign words and idioms, so that the peculiarities of diction which are found in Ecclesiastes, instead of proving that he did not write the book, are only additional mementos of the transgressions which had made so much of his life more bitter than death.

ECCLESIASTICAL COMMISSIONERS FOR ENGLAND, "are a corporation with perpetual succession and a common seal, and with power to take, purchase, and hold real estate, notwithstanding the statutes of mortmain."—Burns' *Eccles. Law by Phillimore.* The ecclesiastical commissioners consist of all the bishops of England and Wales, the deans of Canterbury, St. Paul's, and Westminster, the two chief justices, the master of the rolls, the chief baron, and the judges of the prerogative and admiralty courts; and also nine lay members, seven to be appointed by the crown and two by the archbishop of Canterbury. The lay commissioners, including all the judges, to be members of the united church of England and Ireland. 6 and 7 Will. IV. c. 77, and 3 and 4 Vict. c. 113, down to 29 and 30 Vict. c. 111. The queen is empowered, by 13 and 14 Vict. c. 94, to appoint two, and the archbishop of Canterbury one (lay members of the church of England), by the title of church estates commissioners. The ecclesiastical commission thus constituted is the result of certain reports made by commissioners previously appointed by the crown. The object of the existing commission is best explained by a reference to the instructions given to the original commissioners. "To consider the state of the several dioceses of England and Wales, with reference to the amount of their revenues and the more equal distribution of episcopal duties, and the prevention of the necessity of attaching by commendam to bishoprics benefices with cure of souls; to consider also the state of the several cathedral and collegiate churches in England and Wales, with a view to the suggestion of such measures as may render them more conducive to the efficiency of the established church; and to devise the best mode of providing for the cure of souls, with special reference to the residence of the clergy on their respective benefices." The ecclesiastical commission was permanently established in the year 1835. In order that it should be provided with a fund to enable it to carry out such schemes as should appear to it desirable, the seven best endowed sees were laid under a contribution amounting in all to the annual sum of £22,800. In addition to the income thus provided, several canonries in the various cathedrals are abolished, and other ecclesiastical preferments are extinguished, and the emoluments of the whole are vested in the commissioners. The ecclesiastical commissioners are required to lay before her majesty in council such schemes as appear to them best adapted for carrying out the purposes of the act. It is provided that no proceeding which requires the common seal of the corporation is to be finally concluded, nor is the seal to be affixed to any deed, unless two at least of the episcopal commissioners are present, and consenting. Notice of every scheme is to be given to any corporation, aggregate or sole, affected thereby; and the objections, if any, are to be laid before her majesty in council, together with the scheme. The scheme, if it receive the royal assent, is to be gazetted, and thereupon acquires the power of an act of parliament. By 19 and 20 Vict. c. 55, the duties of the church building commissioners have been transferred to the ecclesiastical commissioners. The latter body have now, therefore, in addition to their previous powers, authority to divide or to unite existing parishes, and to create new districts. Such are, very briefly, the powers of the ecclesiastical commissioners. The policy which led to the appointment of that commission is not a subject for our consideration. But it is easy to see that the influence for good and evil of so powerful an institution, over the church of England, is enormous; and it cannot be matter of surprise that its proceedings are watched with scrupulous jealousy. As a result of its deliberations during 25 years of its existence, two new bishoprics have been created and endowed, and a considerable number of small livings had been augmented.

On the other hand, it must be observed that much indignation has been excited by the expenditure of very large sums on the purchase and improvement of episcopal residences. It is, no doubt, fitting that the episcopal office should be furnished with

appliances suitable to the position and dignity of a bishop; but the peculiar character of the revenues of the ecclesiastical commissioners must be borne in mind in applying those revenues. The funds of which they are composed have been violently diverted from the original purpose of the donors. Public necessity only can justify such an act. The plea put forward is the inequality of the revenues of the clergy, and the insufficient amount of the incomes of many benefices. But it may fairly be questioned whether it is a proper application of those funds to promote the convenience and luxury of those who are already liberally endowed.

ECCLESIASTICAL CORPORATION. The holder of an ecclesiastical benefice is, by the law of England, regarded as a corporation. Ecclesiastical corporations are divided into aggregate and sole. The former consist of several persons, as the head and fellows of a college, the dean and chapter of a cathedral, and are kept up by a continual succession of members. An ecclesiastical corporation sole consists of a single person and his successors in the benefice, as a bishop, a rector, a parson, or a vicar. The object of the common law, in thus regarding the incumbent of the benefice as a corporation sole, is to preserve the temporalities which are vested in him, and which would otherwise descend to his right heirs. The right of a rector or other corporation sole to the church and glebe, though said to be a freehold, is in fact little more than a tenancy for life. He is entitled to the full enjoyment of the benefice during his life, but he cannot sell it, and he is even punishable for waste. He may work mines or pits which he finds in use, but he is not entitled to open fresh mines. His right to timber is confined to felling it for repairs, but he is not entitled to sell it. See CORPORATION.

ECCLESIASTICAL COURTS are courts specially devoted to the consideration of matters relating to the clergy and to religion. For the origin of these courts we must go back to the first days of Christianity, when the early Christians, acting upon the injunction of St. Paul—"Dare any of you having a matter against another go to law, before the unbelievers and not before the saints"—had established courts, apart from those provided by the heathen governors, for the settlement of their own disputes. These courts were presided over by the bishops, who took cognizance of all matters, temporal as well as spiritual, arising among the brethren. As Christianity advanced and was acknowledged as the revelation of the Almighty, these bishops' courts acquired an independent position, and were suffered to exist concurrently with courts of civil jurisdiction (Code lib. i. tit. 4, *de episc. aud.*), and gradually special matters were assigned as the subjects of their peculiar jurisdiction—viz., questions of tithes, and matrimonial and testamentary causes.

All writers on the early constitution of England are agreed in the opinion that, in this kingdom, there existed no separate E. C. before the Norman conquest. Previous to that time, all matters, civil and spiritual, were in use to be heard before the county court, in which the bishop and the earl sat together. But by a charter of William I. a distinction was made for the first time between courts civil and ecclesiastical. By this charter, authority was given to the bishops to hear causes ecclesiastical according to the canon law. The bishops' courts having been thus established in England, they became a fruitful source of dispute between the crown and the see of Rome, the latter claiming supreme jurisdiction in appeal in all causes ecclesiastical. This claim was from time to time conceded by the weakness or necessity of individual sovereigns, to be as frequently retracted when the emergency was past; in particular, by 27 Ed. III. c. 1 and 16 Rich. II. c. 5, all persons were prohibited, under penalty of *præmunire* (q.v.), from resorting to the court of Rome or elsewhere. At the reformation, by 24 Hen. VIII. c. 12, on the recital that the king is, under God, the head of the church, and again, by 25 Hen. VIII. c. 21, the authority of the pope in matters ecclesiastical was finally excluded. In Bacon's Abridgment of the Law, there are enumerated ten E. C.—viz., convocation, the court of arches, the prerogative court, the court of audience, the court of faculties, the court of peculiars, the consistory court, the archdeacon's court, the court of delegates, and the court of commissioners of review. (For a full account of these courts, reference is made to the several heads, and also to the article DOCTORS' COMMONS.) Under the regulation of public worship act of 1874, a new ecclesiastical judgeship was called into existence, with cognizance mainly of offenses in the matter of ritual.

The chief E. C. which have at various times existed in Scotland are the general assembly, the commissary court, and the court of teinds. The former is the tribunal for the consideration of questions of doctrine and discipline according to the Presbyterian usage, and has existed since the reformation. See ASSEMBLY, GENERAL; COMMISSARY; TEINDS.

ECCLESIASTICAL HISTORY, in its widest range, is the history of religious organization among men, on the basis of divine revelation, from the creation to the end of the world. It is distinct from secular history; yet so inseparably connected with it, that one can never be fully understood without the other. Ecclesiastical history is divided into two great periods by the completion of the Scriptures as the inspired word of God. The first, extending from the creation to the end of the apostolic age, includes the days before the flood, the times of the patriarchs, of the exodus from Egypt, and the conquest of Canaan, of the kings and prophets, the captivity, restoration, and sub-

jection to Roman rule; the mission of John the Baptist, the advent, life, and work of Christ, and the apostolic founding and extension of the church. At the close of the apostolic age, ecclesiastical history, in its more restricted range, begins. It may be assigned in three great divisions:

I. ANCIENT CHRISTIANITY, from the death of the apostle John to Charlemagne, A.D. 100–800.

1. *The age of persecution;* to the accession of Constantine, 100–325. The principal part of the "ten" persecutions; testimony of the martyrs, confessors, and argumentative defenders of Christianity; beginning of monasticism; rise and progress of the hierarchy; extension of Christianity throughout the empire and beyond its bounds.

2. *The imperial age;* Constantine to Gregory I., 325–590. Influence of Christian emperors within the church; complete establishment of the hierarchy; Arian and Pelagian controversies; fall of paganism; missionary work of Patrick and Columba in the British isles; five general councils, Nicæa, 1st Constantinople, Ephesus, Chalcedon, 2d Constantinople.

3. *The age of Christian nationality* in Europe; Gregory I. to Charlemagne, 590–800. Evangelical British missions in France and Germany; Britain reappears as England, "*Angli or angeli;*" rise of Mohammed; the Saracens overrun Asia, Africa, and Spain, but are defeated in the west by Charles Martel; controversy and commotion concerning image worship and image breaking; temporal power of the pope granted by Pepin and confirmed by Charlemagne; Charlemagne crowned emperor by the pope.

II. MEDIÆVAL CHRISTIANITY, Charlemagne to Luther, 800–1517.

1. *Continued progress of Christianity;* Charlemagne to Hildebrand, 800–1049. Extension of the Latin church in the west and of the Greek in the north-east; progress of the papacy; rise of scholasticism.

2. *Supremacy of the papacy;* from Gregory VII. to Boniface VIII., 1073–1294. Contest between the pope and the emperor; celibacy of the clergy enjoined; the crusades; culmination of scholasticism; mysticism.

3. *Decline of the papacy;* Boniface VIII. to Luther, 1294–1517. The Scriptures forbidden to the laity; the inquisition founded; persecution of the Albigenses; transubstantiation and auricular confession established; reformatory councils of Pisa, Constance, and Basle; heralds of the reformation—Wycliffe in England, Huss in Bohemia, Wessel in Holland, Savonarola in Italy; capture of Constantinople; revival of letters; invention of printing; maritime adventure; discovery of America.

III. MODERN CHRISTIANITY; Luther to the present time, 1517–1880.

1. *Age of Protestant reform and papal reaction;* Luther to peace of Westphalia, 1517–1648. Protestant churches in Germany, France, Switzerland, England, Scotland, America; Puritans, Jesuits, Jansenists; massacre of St. Bartholomew; Protestants banished from Bohemia; thirty years' war; treaty of Westphalia promising religious toleration.

2. *Age of struggle for religious liberty;* peace of Westphalia to the French and English wars in America, 1648–1750. Flight of Huguenots from France; non-conformists driven from their livings in England; growth of Greek church in Russia; increase of Protestantism in American colonies.

3. *Age of revolution, conflict, and progress;* 1750–1880. American independence, with separation of church and state; French revolution from absolute monarchy through democracy and imperialism to a republic; general uprising of the people, and advance in civil and religious liberty; growth of the United States, war of the rebellion, abolition of slavery, revival of evangelical religion; conflict of Christianity with various forms of irreligion and secularism—English deism, French infidelity, German rationalism, materialism; free church of Scotland; disestablished churches in Ireland; growth of ritualism; papal infallibility declared; bible societies, steam navigation, railroads, telegraphs, journalism; improvement of common schools, colleges, technical schools; extension of Christianity over the world.

The SOURCES of ecclesiastical history are, first, *the written;* comprising acts of councils, creeds, liturgies, hymns, church laws, papal bulls, and encyclical letters, writings of the fathers, schoolmen, reformers, and anti-reformers; second, *the monumental,* including crosses, crucifixes, pictures, vestments, furniture, coins, churches, chapels; some of this class are partly written, as inscriptions on walls, pictures, tablets, and tombs. He who is thoroughly familiar with the imagery of the catacombs will sympathize more fully with the heart of the early church, during the period of persecution, than he would be able to do after the profoundest study of books alone. The basilicas, modeled after the grand secular edifices of Greece and Rome, illustrate the external enthronement of Christianity; the Byzantine churches record the splendor of the imperial age; the Gothic cathedrals are trophies of mediæval glory; those of the renaissance are memorials of the attempt to make pagan culture live again in Christian times. The ecclesiastical historian, besides general intelligence, culture, and learning, should possess the critical and judicial faculty, that he may discriminate between conflicting testimonies, and may interpret correctly the witness which he accepts. He should have an insight into speculative thought, metaphysical distinctions and ethical ideas; should be acquainted with human nature, scientifically and practically; should be in sympathy with the spirit of Christ, as exhibited in the New Testament, and have, in his inmost

being, an experience of spiritual truth. His style, in addition to all other attainable good qualities, should present a brilliant panorama rather than a lifeless schedule; should acquire a majesty worthy of the movement of the divine idea through the ages which he unfolds; and should throb with human sympathy as he narrates the endless story of sorrow and joy, fear and hope, spiritual death, and spiritual life.

ECCLESIASTICAL LAW. See CANON LAW.

ECCLESIASTICAL TITLES ASSUMPTION ACT (14 and 15 Vict. c. 60). In 1850, a ferment of Protestant zeal was awakened in this country by an edict issued by the court of Rome dividing Great Britain into territorial bishoprics, under an archbishop of Westminster. The brief was immediately followed by a pastoral by the newly appointed archbishop (cardinal Wiseman) "given out of the Flaminian gate." At the commencement of the parliamentary session of 1851, the subject of "papal aggression," and of the measures to be adopted to counteract it, superseded all other topics of interest. It was in these circumstances that lord John Russell introduced the ecclesiastical titles bill. By the act 10 Geo. IV. c. 7, it had been provided that the right and title of archbishops to their respective provinces, of bishops to their sees, and of deans to their deaneries, as well in England as in Ireland, having been settled and established by law, any person other than the person thereto entitled who should assume or use the name, style, or title of archbishop of any province, bishop of any bishopric, or dean of any deanery, in England or Ireland, should for every such offense forfeit £100. By the Roman Catholic party it was alleged that this enactment struck only at the titles to existing provinces and dioceses, and that though the pope could not create an archbishop of Canterbury, nor could his nominee assume that title without violating the law, there was no prohibition against the creation of an archbishop of Westminster. To meet this allegation, and remove the doubt which existed, the ecclesiastical titles act was passed, its object being to prohibit the assumption of such titles "in respect of any places within the United Kingdom." The penalty of £100 for every contravention of the act is to be recovered in accordance with the provisions of the former act, or at the suit of any person in one of her majesty's superior courts of law, with the consent of the attorney-general in England, or of the lord advocate in Scotland. The third section saves the episcopal bishops in Scotland from the operation of the act, providing, however, that "nothing herein contained shall be taken to give any right to any such bishop to assume or use any name, style, or title which he is not now by law entitled to assume or use." The passing of the act allayed the fears of the country on the subject of papal aggression; and though its provisions were not very steadily complied with in Ireland, no prosecution under it took place.

The Roman Catholic party having always considered the penal clauses of this act as a grievance, an arrangement was made for the repeal of the act. This was accomplished by the act 34 and 35 Vict. c. 53, which, after declaring that "no ecclesiastical title of honor or dignity derived from any see, province, diocese, or deanery recognized by law, or from any city, town, place, or territory within this realm, can be validly created," and that no "pre-eminence or coercive power can be conferred otherwise than under the authority of her majesty," repeals the ecclesiastical titles assumption act (14 and 15 Vict. c. 60) as inexpedient. The result is, that while no prosecution can now take place for assuming such titles, their assumption is still treated by the law as an illegal act.

ECCLESIASTICAL YEAR. See YEAR; also DATE.

ECCLESIAS'TICUS, the title of an apocryphal work, called in the Septuagint *The Wisdom of Jesus, the Son of Sirach*. It obtained the title of E., not because the writer was a priest (for regarding his profession nothing is known), but because it was, in the opinion of the fathers, the chief of those apocryphal works which they designated *ecclesiastici libri* (i. e., books not inspired, but which might be read in church for the edification of the people), to distinguish them from the canonical scriptures of the Old Testament. E. was originally composed in Aramaic; and the original text was apparently extant in the time of Jerome, who states that he had seen the Hebrew, but it is now lost. The author calls himself Jesus, the son of Sirach of Jerusalem; but when he flourished is not known. His book was translated into Greek, with an introduction by his grandson, who is usually, but not correctly, supposed to have had the same name as his grandfather. The date of the translation has been fixed as low as 130 B.C., and as high as 230 B.C. The former is the more probable. The contents of the work are not systematically arranged, so that we can only guess at what may be called the method and purpose of the thinking. The view taken of the mercy of God as extending to all mankind, indicates that the Jewish notions were breaking up; but still there is little to show that any great spirituality was taking its place. Its tone resembles that of the book of Proverbs. Exhortations to cheerfulness are constant; medicine, agriculture, etc., are highly praised; life is regarded from an ethical rather than from a religious point of view, and consequently "wisdom" is represented as the source of human happiness. The style of the w riter is at times noble, and even sublime; and, to use the langnage of Addison, "it would be regarded by our modern wits as one of the most shining tracts of morality that are extant, if it appeared under the name of Confucius or of any celebrated Grecian philosopher."

ECCLESIASTICUS, Book of (*ante*), the longest and one of the best books of the Apocrypha. Affixed to it are two prologues: the first, by an unknown author, states that the Jesus, son of Sirach, whose name is at the head of the book, lived in the latter times, after the people had returned home from the captivity; that his grandfather Jesus, a man of great diligence and wisdom among the Hebrews, having gathered the instructive and short sentences of the wise men who preceded him, and having himself uttered some full of wisdom and understanding, died, leaving the book almost finished; and that his son Sirach left it to his son Jesus, who set it in order and finished it, calling it *Wisdom:* the second prologue is by this Jesus son of Sirach, giving a similar account of the author, and adding concerning himself that he had thought it incumbent on him to translate and finish the book. The translation was made from the Hebrew, as this second prologue affirms; and Jerome testifies that he had seen a copy of the book in that language. Chap. I. contains a glowing eulogium on Simon the high-priest which implies that it was written after his death. And although there were two high-priests of that name, the grandeur of the description is appropriate only to the first, who died about 300 B.C. How long after that date the book was written, is not known. It was translated during the reign of Euergetes. But as two of the Ptolemies were well known by that surname, the precise date is not determined. The book, regarded by critics as almost incapable of analysis, because of the derangement and corruption of the text, may be summarized as to its teachings on important points. I. *Its main object*—as set forth by the name which the translator gave it—is to describe the true nature of *wisdom*, to exhibit its importance in all the employments and relations of life, and to exhort all men to seek it diligently. It is declared to come from God as its author, and to be in his Word as its fountain. It is the gift of God to those who love him, fear him, and do his commandments. In many respects the ideal of wisdom which the book presents is elevated and good, and its ideal of morality and piety is creditable, if judged by the standard of the time when it was written. Yet the wisdom scarcely equals that of the proverbs or of Job; and the morality falls short of the holiness which the Scriptures exhibit and enforce. II. *The character which it ascribes to God.* It declares him to be in his being from everlasting to everlasting, the creator of all things, greater than his most glorious works, infinite, almighty, omniscient, righteous, holy, greatly to be feared, compassionate, long-suffering, merciful, forgiving. III. *Its view of God's providential government.* It affirms that, sitting on his throne, he governs the world with the palm of his hand, and marking, with eyes ten thousand times brighter than the sun, the ways of men; humbling and exalting them according to his pleasure and their deserts; plucking up the proud nations and planting the lowly in their place; hating sin, visiting vengeance on the ungodly, and reserving them for the day of their punishment; regarding the prayer of the poor, and inflicting swift judgment on their oppressors; sending his blessing on children who honor their father, and his curse on those who provoke their mother; watching over them that love him as their mighty protector and strong stay. IV. *Does it teach anything concerning a future life?* Its general scope has regard to this life only. The advantages of wisdom and piety, of prayer, of morality and righteousness, are set forth constantly and in positive terms as bearing on this world, on youth, manhood, old age, and long life. The virtue and piety of fathers will make an honorable memorial for themselves, and will be beneficial to their children after them. But scarcely is there any reference to anything beyond death and the grave. There are few allusions, even, to the question whether there be a future life or not. Such passages as these exhibit the general view—"All things cannot be in men, because the son of man is not immortal." "The number of man's days at the most is 100 years; as a drop of water to the sea and a gravel stone to the sand, so are 1000 years to eternity." "Weep for the dead, for he hath lost the light; make little weeping for the dead, for he is at rest." "There is no inquisition in the grave, whether thou have lived 10 or 100 or 1000 years." Yet there are some exceptions which must be taken into the account in judging the book. Once it is said, "They that do the things which please the Lord shall receive the fruit of the tree of immortality." And once, "At the end of the way of sinners is the pit of hades." And when the historical characters of the Old Testament are reviewed and praised, it is said of Enoch, that "he pleased the Lord and was translated;" of Elias, that "he was taken up in a whirlwind and in a chariot of fiery horses;" and of Samuel, that "after his death he prophesied and showed the king his end." V. *Does it teach anything concerning atonement for sin and the promised Savior by whom the atonement was to be made?* It says of forgiveness, as the Lord Jesus afterwards taught, "Forgive thy neighbor the hurt that he hath done unto thee, so shall thy sins also be forgiven when thou prayest." Of atonement it says, as the Lord Jesus did not teach, "Whoso honoreth his father maketh atonement for his sins." "In the day of thy affliction the relieving of thy father shall be remembered, thy sins also shall melt away as ice in warm weather." It recognizes Aaron's consecration as a high-priest "to make reconciliation for his people," but gives no assurance of faith in a greater high-priest to come. It commends Isaiah as a great and faithful prophet, "comforting those that mourn in Zion, and showing what should come to pass forever;" but gives no intimation that among those future events there was the coming of a Savior to die for sinners and to make intercession for them. It quotes from Malachi the future mission of Elias, "to turn the heart of the fathers to the children;" but says nothing about the coming of the

Lord to his temple. Yet it does say that "the Lord gave a remnant to Jacob, and out of him a root unto David." It does say, "I will thank thee, O Lord my king, and praise thee, O God my Savior." And it contains the remarkable record, "*I called upon the Lord, the Father of my Lord,*" which, without attempting an interpretation of it, we may group with David's declaration, "The Lord said unto my Lord," and Paul's doxology, "Blessed be the God and Father of our Lord Jesus Christ." VI. *Its testimony to the historical character of the Old Testament Scriptures.* That the writer was familiar with the Old Testament, containing, substantially, the same books and the same things that it contains now, is manifest from his references to nearly all the prominent personages and principal scenes of its long history, from Adam to Zerubbabel. Yet two surprising omissions must be noted; there is no mention of Ezra by the side of Nehemiah, and no reference to Daniel.

ECCLESIOL'OGY, a word of recent use, is the name which has been given in the British islands to the study of church architecture and decoration. Besides discriminating the various styles of ecclesiastical architecture, E. takes account of the ground-plan and dimensions of a church; of its orientation, or the deviation of its line from the true east; of its apse, or circular or polygonal east end; of its altar or communion table, whether fixed or movable, stone or wood; of its reredos, dossel, or altar-screen; of its piscina, or basin and drain for pouring away the water in which the chalice was rinsed, or the priest washed his hands; of the sedilia, or seats for the priest, deacon, and subdeacon, during the celebration of the eucharist; of the aumbrye, or locker, for the preservation of the communion vessels and elements; of the "Easter sepulcher," or recess for the reception of the host from Good Friday till Easter day; of the altar-candlesticks; of the altar-steps; of the altar-rails; of the credence table, or shelf on which to place the communion elements before they were put upon the altar; of the "misereres," or elbowed stalls; of seats within and without the chancel walls; of the height of the chancel as compared with the nave; of the chancel arch; of the rood-screen, rood-staircase, rood-door, and rood-loft; of the piers or columns; of the triforium or blindstory; of the clerestory; of the windows; of the parvise-turret, or outside turret leading to the parvise; of the roof or groining; of the eagle-desks and lecturns; of the pulpit; of the hour-glass stand, by which the preacher was warned not to weary the patience of the flock; of the reading pew; of the benches, pews, and galleries; of the aisles; of the shrine, fertour, or reliquary; of the benatura, or holy-water stoup; of the corbels, with special reference to the head-dress figured on them; of the pavement; of the belfry; of the baptismal font, with its accessories, the baptistery, the steps, the kneeling-stone, the chrismatory, the cover, and the desk; of the tower, with its lantern, parapet, pinnacles, louvres, windows, buttresses, and bells; of the porch and doors, with their niches and seats; of the parvise, or priest's chamber above the porch; of the moldings; of the pinnacle crosses; of the gurgoyles, or rain-spouts; of the church-yard or village cross; of the church-yard yew; of the lych-gate, or corpse-gate, where the corpse was met by the priest; of the crypt; of the confessional; of the hagioscope, or opening in the chancel arch through which he elevation of the host might be seen; of the lychnoscope, or low window in the side-wall of the chancel, the use of which is uncertain; of the chest for alms; of the table of the ten commandments; of the church-plate; of the faldstool, or litany stool; of the embroidered work; of the images of saints; of the church well; of the sepulchral monuments and brasses, with their inscriptions; of the chapels or sacristies; of the vestry; of the dedication crosses. E. has a literature of its own, represented by such works as the *Handbook of English Ecclesiology* (Lond. 1847) of the "Ecclesiological Society;" Walcott's *Sacred Archæology;* Bourassé's *Dictionnaire d'Archéologie Sacrée,* and the like.

ÉCHELON (from the Fr. *échelle,* ladder) is such a formation or arrangement of troops that, if viewed from a height, they would present some analogy to the successive steps of a ladder or staircase. The several divisions of the force, although parallel, are no two on the same alignment. Each has its front clear of that in advance, so that, by marching directly forward, it can form line with it. There are two kinds of E., *direct* and *oblique. Direct* E. is adapted for attack and retreat; while *oblique* E. (oblique in reference to the original front of the line) is adapted for changing position, or for getting on the enemy's flank.

The word E. is also used in reference to nautical maneuvers. A fleet is sometimes said to be arranged *en échelon;* at which time it is compared by sir Howard Douglas to a body of infantry in a square, having its diagonal parallel with the front. In other words, it presents a wedge-form towards the enemy. Under this arrangement the bow-guns and broadsides of the several ships can mutually defend each other; the stronger parts of one ship defending the weaker parts of some other.

ÉCHEVIN, an officer in France of a rank existing from the days of Charlemagne to the revolution of 1789. His general functions were financial. In Paris, the échevins were assessors; and in some cases they had the authority of local magistrates.

ECHID'NA, a genus of quadrupeds peculiar to Australia, and belonging to the order *monotremata.* Two species have been described, differing in the scantiness and abundance of the hair, but it seems not improbable that they are mere states of the same species, perhaps depending on the seasons or on age. The E. is about the size of a

hedgehog, and, like that animal, is covered with spines; which, however, are much larger and stronger, and are placed among soft silky chestnut-colored hair. Its head is small, the muzzle much elongated and slender, terminating in a small mouth, which is destitute of teeth, but furnished with several rows of small spines upon the palate, directed backwards. The tongue is extensile, and is used, like that of ant-eaters, for catching ants, the ordinary food of the animal. The tail is very short. The legs are also very short, each foot furnished with five large broad claws, fit for digging and burrowing, the claws of the hind feet being concave, and directed backwards and outwards, so as to form very efficient shovels for throwing out the earth. The E. burrows with great rapidity, being possessed of strength perhaps greater in proportion to its size than that of any other quadruped. When it cannot more completely disappear under the earth, it inters itself so far as to present only its spiny back to an assailant. The E. is capable of very long abstinence, and confines itself to its burrow during droughts. In confinement, it may be fed on milk, hard-boiled eggs, etc.

ECHIMYD, *Echimys*, a genus of rodent quadrupeds, in some of their characters agreeing with dormice, but differing from them in having the tail scaly, and the fur coarse and mingled with flattened spines. They are all South American. Some of them are known as spiny rats. They display considerable beauty of color. One species excavates long burrows in the ground.

ECHIN'ADES, islands in the Ionian sea, around the entrance to the gulf of Corinth. They were said to have been formed by drifts from the river Achelous. They are now called the Curzolari islands, and are of little importance. Homer says they were inhabited, but later authors report otherwise. There are at present a few small villages on them. The battle of Lepanto was fought off these islands, Oct. 7, 1571.

ECHINEIS. See REMORA.

ECHINIDÆ, a family of *echinodermata*, the species of which are popularly known as sea-urchins, sea-eggs, etc. They have the body covered with a calcareous crust or shell, of an extremely porous structure (and thus differing very widely from the shells of mollusks), in polygonal plates nicely adapted to each other, and increasing by additions to the edges of each plate, so that the shell may enlarge with the enlargement of the animal, whilst new plates are also added around the superior orifice. The shell is pierced with rows of holes for the ambulacra (q.v.), and is externally covered in a living state with a membrane—sometimes very delicate, sometimes thick and spongy—which communicates by many delicate processes with the interior, and unites the bases of all the spines. The spines differ very much in the different genera and species, in their length, strength, number, and arrangement; they are attached to tubercles on the surface of the shell, by cup-like bases capable of working upon the tubercles, in the manner of a ball-and-socket joint; and they are moved by means of the connecting membrane so as to be employed in locomotion. In some species, they seem to be the principal organs of locomotion; in others, the ambulacra are so. By means of the spines, some, in which they are few and strong, can walk even on dry ground; others, in which they are minute and very numerous, employ them in burying themselves in the sand. The mouth of the E. is situated at the lower orifice of the shell, and is generally furnished with five flat calcareous teeth, moved by a very complex apparatus of bony sockets and muscles—"a very powerful mill" for grinding down their food, which is supposed to consist of small crustaceans and mollusks. The intestine is long and spiral; the vent, in the E. of most regular form, is at the upper end of the shell, exactly opposite the mouth; in others, in which there is a departure from the characteristic orbicular form, it is more or less lateral. The E. abound in all seas, and seem to have abounded still more in former geological periods. "Of all the *radiata*, they are most perfectly preserved in a fossil state," and the knowledge of their habits and organization is necessary to the geologist, "in order to understand the relations and associations of the numerous species which abound in many of the earth's strata."—Forbes.

ECHINOCOC'CUS. See TAPE-WORM.

ECHINODER'MATA (Gr. spiny-skinned), a class of radiate animals, the highest in organization of that great division of the animal kingdom. They have a digestive and a vascular system; for the former, however, there is in many of them only a single orifice; a circular and radiating nervous system has been observed in many; they are especially characterized by their well-organized skin, which in many is strengthened by calcareous plates, and in some also has the additional protection of numerous long spines. *Echinidæ* (sea-urchins) exhibit these characteristics in greatest perfection. *Asteriadæ* (star-fishes), *ophiuridæ* (brittle-stars), *crinoideæ*, *holothuridæ* (sea-slugs, sea-cucumbers, etc.), and *sipunculidæ*, are also ranked among the E., and have been variously arranged in orders by different naturalists. Spines are wanting in most of them; in some (*holothuridæ* and *sipunculidæ*), there are not even calcareous plates, and there is no inconsiderable departure from the ordinary and perfect radiate form, an approach being made to the forms of mollusks and worms, whilst yet the accordance with the other E. is very perfect in other parts of the organization. Almost all the E. are free, moving about at the bottom of the sea; some of them—at least in an immature state—are stalked and fixed. They are provided with "an apparatus for water circulation," a peculiar charac-

teristic of radiate animals, and which "can scarcely be said to exist in any of the other types." By means of this it is that they fill and fit for use the suckers or *ambulacra* (q.v.) with which most of them are provided, but of which the *sipunculidæ* are destitute. The spines as well as the ambulacra of the E. are used by those which possess them (*echinidæ* and *ophiuridæ*) as organs of locomotion.—The British E. are described by Dr. Edward Forbes in an interesting work, entitled *A History of British Star-fishes and other Animals of the Class Echinodermata* (Lond. 1841).

ECHI'NUS, of Vitruvius, is a classical molding in the form of a series of eggs, whence it is also called the ovolo or egg-molding. The eggs are sometimes divided by an anchor or dart. The type of this ornament is sometimes said to have been the chestnut and shell.

ECHI'NUS, a genus of the order *echinodermata*, known as sea-urchins, found along the American coast. The common echinus of the Atlantic coast is about an inch in diameter; but some kinds are three or four times as much. They have globe shaped cases, flat on the lower side, formed of calcareous plates, covered on the outside with movable spines from 1 to 5 in. long. With the aid of the spines and a great number of feet with suckers at the ends, the animal rolls slowly over the bottom, or clings to neighboring objects. They bore holes in the hardest rocks, where they make their homes, increasing the cavities as they grow, but not the opening, and so are often prisoners for life. Some species bury themselves in the sand near the water. In tropical climates some of the largest are used for food.

E'CHIUM. See VIPER'S BUGLOSS.

ECHMIEDZIN'. See ETCHMIADZIN.

ECHO (Gr. *sound*). Sound is produced by waves or pulses of the air; when such a wave comes against a wall or other opposing surface, it is reflected like light, and proceeds in another direction, and the sound so heard is an echo. Even the surface of a cloud suffices to reflect sound, as may be observed during thunder and the discharge of cannon. That the echo of a sound may return to the point where the sound originated, the reflecting surface must be at right angles to a line drawn to it from that point. Oblique walls send the echoes of a person's voice off in another direction, so that they may be heard by others, though not by him. In order to echo words distinctly, the reflecting surface must on the whole be even, or so curved as to resemble a concave mirror. This last form is necessary for returning a distinct sound when the distance is considerable. A great degree of evenness, however, is not essential, as it is no uncommon thing for the edge of a wood to return an echo. The distance of the reflecting surface must also be such as to allow a sufficient time to elapse between the sound and the return of the echo for the ear to distinguish them; when they succeed too closely, they merge into one. An interval of about $\frac{1}{9}$ of a second is necessary to discriminate two successive sounds; so that if we assume 1125 ft. as the distance traversed by sound in a second, $\frac{1}{18}$ of 1125, or 62 ft., will be the least distance at which an echo can be heard, as the sound will go that distance and return in $\frac{1}{9}$ of a second. If the distance is less, the echo only clouds the original sound, but is not heard distinct. It is these indistinct echoes that interfere with hearing in churches and other large buildings (see ACOUSTICS); hence anything that breaks the evenness and continuity of the reflecting surfaces is an improvement in this respect. The number of syllables that any particular echo will repeat, depends upon how many can be uttered in the time that the sound takes to go and return from the reflecting surface. The echo at the tomb of Metella, in the Campagna, near Rome, of which Gassendi speaks as repeating a hexameter line requiring $2\frac{1}{2}$ seconds to utter it, must therefore come from a distance of about 1500 feet. Such echoes are rare, as the various conditions are seldom all fulfilled. When there happen to be several reflecting surfaces at different distances in the direction of the sound, with a sufficient interval between them, each gives a separate and distinct echo. A similar effect is produced when two surfaces are inclined to each other in such a way as to give repeated reflections of the sound from the one to the other like the mirrors of a kaleidoscope, thus multiplying echoes of echoes. To this multiple and repeating class belong the famous echoes of Killarney, and that produced between the wings of the castle of Simonetta, near Milan, which repeats the report of a pistol 60 times.

ECHO, in music, is the repetition of a melodic phrase, frequently written for the organ, on account of the facility with which it can be produced by the stops.

ECHO, in Grecian mythology, one of the Oreades, or mountain nymphs. The name denotes sound in the abstract. Echo could not speak until spoken to—a punishment inflicted upon her by Juno, who was detained by Echo's talkativeness while Juno was hunting among the Oreades for her truant Jupiter. A further legend is that Echo fell in love with Narcissus; but as he did not respond, she wasted away with grief until nothing but her voice remained; whereupon Nemesis punished the fickle Narcissus by causing him to fall in love with himself.

ECHO CAÑON, a deep ravine in Utah, near the Union Pacific railroad; 975 m. w. of Omaha. The sides are of rock, bare, and almost vertical in position. The scenery is remarkably beautiful and sublime.

ECHOLS, a co. in s. Georgia, bordering on Florida, intersected by a branch of the Atlantic and Gulf railroad, and the Allapaha river; 400 sq.m.; pop. '70, 1978—465 colored. The surface is level and the soil sandy. Productions, corn, cotton, etc. Co. seat, Statenville.

E'CIJA, a city of Spain, Andalusia, in the province of Seville, and 45 m. e.n.e. of the town of that name, is situated on the left bank of the Jenil, in lat. 37° 33′ n., long. 5° 8′ west. It is surrounded by gardens, and stands in the center of a district fertile in corn and oil. E. is a well-built and prosperous town. On account of the heat of the climate, this town is called by the Spaniards the oven of Andalusia. E. has many pleasant alamedas (public promenades), shaded by trees, and adorned with statues and fountains; the principal promenade is that which stretches along the banks of the river. Pop. 24,000. E. was called in ancient times *Astigis*, and was one of the chief cities of the Roman province of Hispania Bœtica; its origin is unknown. It is said to have been visited by the apostle Paul, a gilt statue of whom may be seen in the city. E. was called *Colonia Augusta Firma* by the Romans, and abounds in Roman antiquities. It also presents several specimens of Moorish architecture in the shape of gates and massive towers.

ECK, JOHANN MAYR VON, the well-known adversary of Luther, was b. in 1486 at Eck, a village in Suabia, where his father, Michael Mayr, was a peasant, and afterwards a bailiff. Endowed with considerable ability, young E. commenced at an early period the study of the church fathers and the scholastics, and acquired a great skill in theological disputation. In 1518, when his *Obelisci* appeared in opposition to Luther's *Theses*, he was doctor of theology, canon of Eichstädt, and pro-chancellor of the university of Ingolstadt. The publication of his *Obelisci* involved him in a disputation with Karlstadt, which lasted from the 27th June to the 16th July, 1519. The only effect of the disputation on the people was to make them wonder at E.'s volubility; but having impugned some of Luther's views in the course of his disputation, he was assailed by the great reformer, and by Melanchthon. E. nicknamed his opponents *Lutherans*, and instigated partly by personal hatred, and partly by Fugger (q.v.), went to Rome in 1520, to induce the pope to take strong measures against Luther. He returned with a papal bull of condemnation in his pocket, but the people in many places stood by Luther; and at Leipsic, in particular, E. was so roughly received, that he had to take refuge in the monastery of St. Paul's. Later we find him at the Augsburg diet of 1530, where he let slip out the memorable statement, that "with the church fathers, he would venture to oppose the Augsburg confession, but not with the Scriptures." In the religious convocations held at Worms in 1540, and at Ratisbon in 1541, he also took part. He died in 1543. A desire to shine and to play an important part in the affairs of men, coupled with a strong love of lucre, were the leading features of his character. Though an extremely learned ecclesiastic, he had no great talent, but was loud, boisterous, and full of assurance.

ECK'ERMANN, JOHANN PETER, well known to the literary world through his intercourse with Goethe, was b. in 1792, at Winsen on the Luhe, in Hanover, studied, 1821–23, at Göttingen, and afterwards went to Weimar, where he took part in the *rédaction* of the last volume of Goethe's *Sämmtliche Werke*. At the same time, he commenced to contribute articles to the *Morgenblatt*, on art and antiquity. In 1827, the university of Jena conferred on him the degree of PH.D. Two years later, he was appointed to superintend the studies of the heir to the grand duchy of Weimar, in the German and English languages and literature. In 1830, he traveled with Goethe's son in Italy, and on the death of the patriarch of German literature, he edited his posthumous writings. During the years 1839–40, he edited a new edition of Goethe's *Sämmtliche Werke*, in 40 vols. But E. is most widely and favorably known by his *Gespräche mit Goethe* (Conversations with Goethe). The greater part of these *Gespräche* appeared at Leipsic in 1836, the remainder at Magdeburg in 1848. It cannot be said with truth that E. has done for Goethe what Boswell did for Johnson, because Goethe did not require this. Johnson's writings give us but a faint idea of the man; hence Boswell's *Life* looks like a revelation; whereas there was the most perfect harmony in Goethe between the man and the author. Still, E.'s book is of immense value, just because it shows us this harmony, giving us, as it does, a picture of Goethe in his manifold social and literary relations, and exhibiting to us the simple, natural, and noble principles on which he studied and wrote. The *Gespräche* have been translated into all European languages, even into Turkish. The best English translation is that by John Oxenford (Lond. 1850). E. died at Weimar, 3d Dec., 1854.

ECKFORD, HENRY, b. Scotland, 1775; d. Constantinople, 1832. He was one of the earliest of the famous shipbuilders of New York. In 1812, during the war with England, he built a fleet of vessels for service on the lakes. He was the builder of the *Robert Fulton* which made the voyage by steam to Havana and New Orleans. In 1820, he was naval constructor at Brooklyn, and built six ships of the line. Afterwards he built many ships for foreign powers. In 1831, he built a man-of-war for Mahmoud, the sultan of Turkey, and visited that country to organize a navy-yard.

ECKHART, JOHANNES, generally called MEISTER (master) ECKHART, lived in the latter part of the 13th and beginning of the 14th c.; b. probably about 1250. He was

of the Dominican order, and for some time professor in a college in Paris. Boniface VIII. called him to Rome to assist in the controversy between the pope and Philip of France. In 1304, he was provincial of his order for Saxony, and in 1307, vicar-general of Bohemia. He was distinguished for practical reforms, and for his power as a preacher. He systematized and expounded the fundamental notions of the Beghards (q.v.) and Brethren of the Free Spirit. The opponents of the Beghards found some propositions in Eckhart's works for which he was called to account by the inquisition at Cologne. He made a conditional recantation, and appealed to the pope, by whom some of his propositions were formally condemned. About the time of the issuing of this condemnation, Eckhart died. His works show that he was deeply learned in all the philosophy of the time, and one of the profoundest thinkers of all time. His style is without system, brief, mystical, and full of symbolical expressions; but his thinking was clear, calm, and logical; and he gave the most complete exposition of what may be called Christian pantheism. The starting point of his doctrine is that, apart from God, there is no real being. But, in his view, God is the unknown. He conceives of the Godhead, as without any thing that can be affirmed concerning it. Any thing definitely ascribed to it would limit and therefore destroy its infinity. The Godhead is not God as known to us. From it proceeds the triune God, who is known. The *essence* of the Godhead is what it is in itself; its *nature* is that which it becomes as an object for others. It reveals itself in the personal God, the Father. The Son is the word or expression through and in which the Father becomes self-conscious. The Father eternally begets the Son, and the Son's return into the Father in love and mutual will is the Spirit. The Father is not before the Son; only through the begetting of the Son, only through arriving at self-consciousness, does he become the Father. The genesis of the Son from the Father involves also the production of the world of things; for God is reason, and in reason is contained the ideal world of creatures. In the Son all things are made in ideal form. As all things have arisen from God, so they all tend to return to him. Repose in him is the end of all things; and in man, the noblest of creatures, this end is realized. In him, specially, there is the power of reaching to the absolute, the ground both of God and the universe. This power—which E. called *the spark*—is in truth God working in man. In cognition of God, God and man are one; there is no distinction of knower and known. Union with God—the birth of the Son in the soul—is the ultimate end of activity and is to be attained by resigning all individuality. When this is reached the soul is one with God; its will is God's; it cannot sin. Yet all this applies only to the "spark" in the soul, the other powers of which may be properly employed about other things. Thus, the way is left open to adjust the balance between feeling and action; between philosophical theory and practical life. In Eckhart's theories appear at least the elements of some modern metaphysical speculations.

ECKHUNG' CHOO, a river of Thibet, is supposed to be the head stream of the Indus. It rises on the n. side of the Himalaya, near the sources of the Sutlej. The actual locality of its sources has been assigned to the Kailas mountains, in lat. 31° 25′ n., and long. 81° 40′ east. Flowing to the n.w., E. C. reaches long. 79° e. before it assumes the name of Indus.

ECK'MÜHL, a village on the Laber, in Bavaria, notable for the battle fought there, on the 22d April, 1809, between 75,000 French and 40,000 Austrians. The archduke Charles had taken up his position on the right bank of the Danube, near Eckmühl. From this point, at the head of four divisions of the Austrian army, he threatened Napoleon, and hoped to gain possession of the road to Donauwörth, the occupation of which would have decided the fate of Bavaria. This was prevented by Davout, who, moreover, by repeated attacks, contrived to keep the archduke in ignorance of Napoleon's designs. The plan of the latter was to cut off the Austrians from their whole remaining communications with the Iser and Inn, and by throwing them back upon Ratisbon and Bohemia, as their only line of retreat, to sever them entirely from the support and protection of Vienna. On the 22d, Napoleon suddenly appeared, with his army, opposite the village of Eckmühl. The action, on the side of the French, was commenced by Lannes, who drove back the Austrain left, while, at the same time, the village of E. was stormed by the Würtembergers. Shortly after, the high grounds between E. and Laichling, also occupied by the Austrians, were abandoned after a heroic struggle, and the archduke ordered a retreat on Ratisbon, which was admirably executed, though the defeated army was harassed by sixteen cavalry regiments. During the retreat, a magnificent and thrilling encounter took place at Eglofsheim between the French and Austrian cuirassiers, which, though it ended fatally for the latter, was largely instrumental in securing the retreat of the main body of the Austrian army. The Austrians had 5,000 men killed and wounded, and 7,000 taken prisoners, besides losing 12 standards and 16 pieces of cannon. The French loss was considerably less.

ECLAMP'SIA (Gr. *ek*, and *lambanō*—Ion. fut. *lampsomai*—I seize hold of), a somewhat pedantic and unnecessary technical term for convulsion (q.v.).

ECLEC'TICS, ECLEC'TICISM. Eclectics was the name given in ancient times to those philosophers who had no determinate system of their own, but who professed to choose (*eklegein*) from all systems the parts that they considered true. The systems from which the selections were originally made were those of Pythagoras, Plato, and Aristotle, but

ultimately eclecticism lapsed into an attempt to reconcile Platonism and Christianity. The chief representatives of this school were Plotinus and Proclus, who, however, did not so much make up a compound of doctrines gathered from without, as set up a view that endeavored to unite the results of previous systems into a consistent whole. Many of the early fathers of the Christian church who had been educated in the pagan schools of philosophy and rhetoric, and retained a fondness for their early studies, were E., such as Clemens Alexandrinus and Synesius of Cyrene. Modern eclecticism is conceived by some to have originated with Bacon and Descartes, but Hegel may be more properly considered its founder. In his *Philosophy of History* and other works, he endeavors, among other things, to point out the true and false tendencies of philosophic speculation in the various ages of the world; but it is to the lucid and brilliant eloquence of Victor Cousin (q.v.) that modern eclecticism owes its popularity. This system, if it can be so called, may best be defined as an effort to expound, in a critical and sympathetic spirit, the previous systems of philosophy. Its aim is to apprehend the speculative thinking of past ages in its historical development, and it is the opinion of some that such a method is the only one possible in our day in the region of metaphysics.

ECLIPSA'REON, the name given by Ferguson, the astronomer, to a contrivance which he invented for exhibiting the time, quantity, duration, and progress of solar eclipses.

ECLIPSES. An eclipse is an obscuration of one of the heavenly bodies by the interposition of another, either between it and the spectator, or between it and the sun. The causes of E., as suggested in this definition, are so simple and familiar, that it is difficult for us to imagine how deeply E. affected men's minds before the dawn of astronomical science. To the ancients, they were without the order of nature—terrible presages of dire events; and at Rome, at one time, it was blasphemy, and punished by law, to talk publicly of their being due to natural causes. So strong a hold had this superstition on the popular mind, that even after it came to be generally believed that E. of the sun were caused by the moon coming betwixt us and that orb, E. of the moon were still referred to supernatural agency. When the moon was in eclipse, the people turned out and made a great noise with brazen instruments—the idea being, that by doing so they gave her ease in her affliction. According to some, Luna, when in eclipse, was in the pains of labor; according to others, she was suffering from the arts of wicked magicians. Similar notions have prevailed among all barbarian tribes. The Chinese, it is well known, imagine E. to be caused by great dragons trying to devour the sun and moon, and accordingly they beat drums and brass kettles to terrify the monsters into letting go their prey. Several stories are told of these popular superstitions being turned to good account by knowing persons; among which are those which represent Thales as bringing about peace between the Medes and Lydians; and Columbus, when in a great strait, procuring provisions from the natives of Jamaica through the prediction of eclipses.

Stars, planets, and the satellites of planets, may suffer eclipse. The principal E., however, are those of the sun and moon, called the solar and lunar eclipses. The transits of the lower planets over the face of the sun are partial solar E.; but solar E., properly so called, are those caused by the interposition of the moon between the sun and earth. Regarding solar E., it is observed that they happen always at the time of new moon, when the sun and moon are in conjunction, i.e., on the same side of the earth. In a partial eclipse, the sun's disk suddenly loses its circular form; it becomes indented on one side, the indentation slowly increasing for some time, and then diminishing until it disappears altogether. In a total eclipse, the indentation goes on increasing till the whole orb for a time disappears; after a short interval, the sun reappears again, passing through the same phases of obscuration in an inverse order. In an annular eclipse, the whole orb is obscured except a ring or annulus. Lunar E., again, it is observed, happen always at full moon, or when the sun and moon are in opposition, or on opposite sides of the earth, and are caused by the moon passing through the earth's shadow. Such E. are sometimes partial, and sometimes total, but never annular, and in their general phases they resemble those of the sun.

In speaking of E., we shall have occasion to use certain terms, which we shall now define. The *duration* of an eclipse is the time of its continuance, or the interval between immersion and emersion. *Immersion* or incidence of an eclipse is the moment when part of the luminary begins to be obscured; *emersion* or *expurgation* is the time when the luminary begins to reappear or emerge from the shadow. When the quantity of an eclipse is mentioned, the part of the luminary obscured is intended. To determine this part, it is usual to divide the diameter of the orb into twelve *digits;* and the eclipse is said to be of so many digits, according to the number of them contained in that part of the diameter which is obscured.

Having given this general explanation of the facts of observation on which the theory of E. turns, and of the language employed in speaking of them, we now proceed briefly to explain the theory itself, and how it is possible to predict the time of occurrence, and the duration and quantity of eclipses.

1. *Eclipses of the Moon.*—It has been said that these are caused by the moon passing through the earth's shadow. Before this explanation can be accepted, it must be shown that that shadow extends as far as the moon. This is easily done. Supposing

the earth to have no atmosphere, then the shadow is the cone marked in shade in fig. 1, whose apex is at O; and the question is, whether the distance OT from the apex to the earth's center exceeds the moon's average distance from the earth. Drawing TB, SA, from the centers of the earth and sun respectively, perpendicular to the line OBA, touching both spheres, and the line TC parallel to the line OBA, we have from the similar triangles OTB, TSC, the proportion OT : TB : : TS : SC. Now, we know that TS, the (mean) distance of the sun, is equal to about 24,000 times TB; also, from the construction, AC = TB; and we know that SA = 112 times TB, whence it follows that SC = 111 times TB. The above proportion, then, gives OT = 216 times TB, since $\frac{24000}{111}$ = 216 nearly. But the moon's average distance is only 60 times TB (the earth's radius). Hence it appears that the length of the earth's shadow is almost four times the average distance of the moon, and that the moon can enter it. Further, it is clear that, should it do so, it may be totally obscured; for it must enter at a point much nearer T than half the distance OT, which is 108 times TB; and everywhere within that distance it might be shown the breadth of the shadow is much greater than the moon's disk. But one consideration now remains to be stated to complete the proof of the theory of lunar eclipses. It was mentioned that they only occur at full moon, and we know that to be the only time when the earth is between the sun and moon, and so *has a chance* of throwing her shadow upon it. Why they do not occur every full moon, will be explained in treating of the prediction of eclipses.

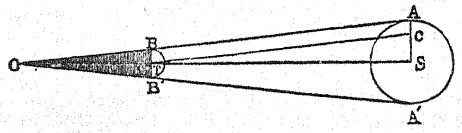


Fig. 1.

In the foregoing explanation, we proceeded on the assumption that the earth has no atmosphere. If the assumption were correct, the earth's shadow would be darker and narrower than it is, and the phenomena of E. shorter in duration, but more striking. The effect of the atmospheric refraction (see REFRACTION) is to bend the rays which are incident on the atmosphere in towards the axis of the cone of the earth's shadow, those which pass through the lowest strata of the air being most refracted, and converging to a point in the line OT (see fig. 1), at a distance equal 42 radii of the earth from the earth's center. Accordingly, the moon, which, as we have seen, crosses the shadow at a distance of about 60 radii, never enters that part of it which is completely dark; thus, she never loses her light entirely, but appears of a distinct reddish color resembling tarnished copper—an appearance caused by the atmospheric refraction, in the same way as the ruddy color of the clouds at sunset. There is another reason why the phenomena of a lunar eclipse are less striking than, from the explanation given relative to fig. 1, might be expected. Every shadow cast by the sun's rays necessarily has a penumbra, or envelope, on both sides of the half-shadow. In the case before us (fig. 2), suppose a cone having its apex O' between the sun and earth, and enveloping each of them respectively in its opposite halves, CO'C' and AO'A' (fig. 2). It is clear that from every point in the shaded part of the cone CO'C', and without the shadow BOB', a portion of the sun will be visible—and a portion only—the portion increasing as the point approaches either of the lines CB, C'B; and diminishing as it approaches the lines BO, B'O. In other words, the illumination from the sun's rays is only partial within the space referred to, and diminishes from its extreme boundary lines towards the lines BO, B'O. When, then, the moon is about to suffer eclipse, it first loses brightness on entering this penumbra; so that when it enters the real shadow, the contrast is not between one part of it in shade and the other in full brilliancy, but between a part in shade and a part in partial shade. On its emersion, the same contrast is presented between the part in the umbra and the part in the penumbra. What we should expect on this geometric view of the earth's shadow, actually happens. From the breadth of the penumbra, it happens that the moon may fall wholly within it before immersion in the umbra commences; and so softly do the degrees of light shade into one another, that it is impossible to tell when any remarkable point on the moon's surface leaves the penumbra to pass into the umbra, or the reverse.

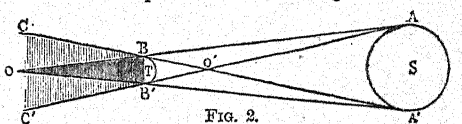


FIG. 2.

2. *Prediction of Lunar Eclipses.*—We said that lunar E. only happen at full moon. They do not happen every full moon, because the moon's orbit is inclined to the ecliptic, on which the center of the earth's shadow moves at at angle of 5° 9′ nearly. Of course, if the moon moved on the ecliptic, there would be an eclipse every full moon; but from the magnitude of the angle of inclination of her orbit to the ecliptic, an eclipse can only occur on a full moon happening when the moon is at or near one of her nodes, or the points where her orbit intersects the ecliptic. An eclipse clearly can happen only when the centers of the circle of the earth's shadow and of the moon's disk approach within a distance less than the sum of their apparent semi-diameters; and this sum is very small; so that except when near the nodes, the moon, on whichever side of the ecliptic she may be, may pass above or below the shadow without enter-

ing it in the least. The moon's average diameter is known to be 31′ 25″.7, and from the *Nautical Almanac* we may ascertain its exact amount for any hour—its variations all taking place between the values 29′ 22″ and 33′ 28″. As for the diameter of the circle of the shadow, it is easily found by geometric construction and calculation, and is shown to vary between 1° 15′ 32″ and 1° 31′ 36″; and its value for any time may be found from the *Nautical Almanac*, to which value astronomers usually add 1′ as a correction for its calculation proceeding on the assumption that the earth has no atmosphere. Starting from these elements, it is a simple problem in spherical trigonometry—which may be solved approximately by plane trigonometry by supposing the moon and the earth's shadow to move for a short time near the node in straight lines—to fix the limits within which the shadow and moon must concur to allow of an eclipse. Recollecting that the earth's shadow on the ecliptic is at the opposite end of the diameter from the sun, and that therefore as it nears one node the sun must approach the other—the sun and shadow being always equidistant from the opposite nodes—we find, from the solution of the above problem: 1. That if, at the time of full moon, the distance of the sun's center from the nearest node be greater than 12° 3′, there cannot be an eclipse. 2. If at that time the distance of the sun's center from the nearest node be less than 9° 31′, there will certainly be an eclipse. 3. If the distance of the sun's center from a node be between these values, it is doubtful whether there will be an eclipse, and a detailed calculation must be resorted to, to ascertain whether there will be one or not. Into the nature of that calculation we shall not attempt here to enter; suffice it to say that, knowing from the *Nautical Almanac* the true time of the sun and moon being in opposition, the true distance of the moon from the node at the time of mean opposition, with the true place of the sun at that time, as well as the moon's latitude, we may, by means of these elements, combined with the obliquity of the moon's path and her motion relative to that of the sun, not only fix whether there shall be an eclipse or not, but predict its exact magnitude, duration, and phases. It may here be mentioned, that before the laws of the solar and lunar motions were discovered with anything like accuracy, the ancients were able to predict lunar E. with tolerable correctness by means of the lunar cycle (see SOLAR CYCLE) of 18 Julian years and 11 days. Their power of doing so turned on this, that in 223 lunations the moon returns *almost* exactly to the same position in the heavens. If she did return to *exactly* the same position, then, by simply observing the E. which occurred during the 223 lunations, we should know the order in which they would recur in all time coming.

All lunar E. are universal or visible in all parts of the earth which have the moon above their horizon, and are everywhere of the same magnitude, with the same beginning and end; and this universality of lunar E. is the reason why it is popularly thought, contrary to the fact, that they are of more frequent occurrence than solar eclipses. The eastern side of the moon, or left-hand side as we look towards her from the north, is that which first immerges and emerges again. The reason of this is, that the proper motion of the moon is swifter than that of the earth's shadow, so that she overtakes it with her east side foremost, passes through it, and leaves it behind to the west. It will be readily understood, from the explanations above given, that total E. and those of the longest duration happen in the very nodes of the ecliptic. But from the circumstance of the circle of the shadow being much greater than the moon's disk, total E. may happen within a small distance of the nodes, in which cases, however, their duration is the less. The further the moon is from her node at the time, the more partial the eclipse is, till, in the limiting case, she just touches the shadow, and passes on unobscured.

3. *Eclipses of the sun*, so called, are caused, as we have stated, by the interposition of the moon between the earth and sun, through which a greater or less portion of the sun is necessarily hid from view. In one sense, a solar eclipse might more properly be called an eclipse of the earth, caused by the moon's shadow falling upon it.

By a process similar to that used in ascertaining the length of the earth's shadow, it can be shown that the greatest value of the length of the moon's shadow is 59.73 semi-diameters of the earth; at the same time, we know that the least distance of the moon from the earth is about 55.95 semi-diameters. It follows that when a conjunction of the sun and moon happens at a time when the length of the shadow and the distance of the moon from the earth are, or are nearly, equal to the values above stated, the moon's shadow extends to the earth and beyond it. Should the shadow in these circumstances fall upon the earth, there will be a total eclipse of the sun at all places within it or over which it moves (fig. 3). If L be the moon, T the earth, and *ab L* the moon's shadow cast by the sun, there will be a total eclipse of the sun at every point that is completely within the portion *ab* of the earth's surface. Again, the smallest value of the length of the moon's shadow may be shown to be 57.76 semi-diameters of the earth, and the greatest distance of the moon from the earth is 63.82 semi-diameters. Suppose the moon interposed between the earth and sun when these values concur, it is clear that the moon's shadow will fall short of the earth. In this case, the sun cannot be altogether hid from any point of the earth's sur-

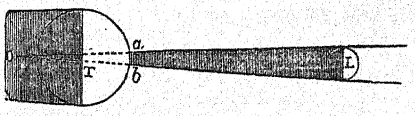


FIG. 3.

face; but this case, or one approximate to it, is that in which there will occur an annular eclipse. In the figure, suppose O to be the apex of the shadow which falls short of the earth, and conceive the cone of the shadow produced earthwards beyond O into a second cone O*cd*; then from every point within the section *cd* of the earth's surface, the moon will be seen projected as a black disk on the middle of the disk of the sun, the portion unobscured forming a ring or annulus of light. While in the two cases just described the eclipse is total or annular at places within *ab* or *cd*, it will be partial at other places; the moon will appear projected against a portion of the sun's disk, making a circular indentation. To ascertain the places at which the eclipse will be partial, we have merely to form the cone of the penumbra of the moon's shadow in the manner explained in treating of lunar E.: at all places on the earth's surface within that cone there will be a partial eclipse. A simple calculation shows what is the observed fact, that the cone of the penumbra is not nearly large enough to embrace the whole of the face of the earth directed to the sun; in other words, solar E. are not universal, like those of the moon, i.e., they are not seen from all places that have the sun above their horizon at the time of the eclipse, which is the reason that though they are of more frequent occurrence than lunar eclipses, the latter are commonly supposed to occur more frequently.

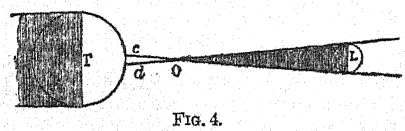


FIG. 4.

If one could take up a position in space from which he could command a view of the whole face of the earth turned to the sun during a lunar eclipse, the phenomena which he would observe would be somewhat as follows. Marking the point of the earth first touched by the penumbra of the moon's shadow, he would observe the obscuration spreading therefrom over a wide and wider area as the penumbra advanced, till at last, supposing him to be viewing the case of a total eclipse, there appeared the umbral cone marking the earth with a dark spot. By and by, the whole penumbral shadow would be on the earth. The black spot would then appear to travel onwards with the motion of the shadow, and in its center, in a course determined by the composition of the proper motion of the shadow or moon, and the motion of rotation of the earth. Part of the globe would be free from the affection, and, in the course of time, the umbral spot would progress over different portions of the earth in succession, till at last it passed off the earth's surface, drawing after it the penumbral shadow. Could the spectator mark on the globe the various places affected by the shadow, with their degrees of shading, he would have a perfect chart of the course of the eclipse. The small belt of the globe traversed by the umbra would mark all places at which the eclipse would be total, while the degrees of shading over places adjoining that belt on both sides would indicate the magnitude of the partial eclipse as seen from them. The breadth of the belt traversed by the umbra, when the sun's distance is greatest and the moon's least, is estimated at about 180 m.; and in the same case the penumbra is estimated to cover a circular space of 4,900 m. in diameter, the eclipse happening exactly at the node. If the eclipse does not happen at the node, it is clear that the axis of the shadow must be inclined to the plane of the ecliptic, that the shadow will be cut obliquely, and therefore that the part of the earth in shade will be oval. It may here be stated that astronomers usually calculate beforehand the motion of the shadow over the earth's surface, and prepare charts to exhibit its motion. Such a chart an observer from a position outside the earth would have it in his power to make from observation.

Of the commoner phenomena attending an eclipse of the sun, as regards the appearance of that luminary, nothing need be said; they are perfectly analogous to those of lunar E., except in the case of the eclipse being annular. There are other appearances, however, attending an eclipse of the sun, especially when it is total, that are very remarkable. The most instantaneous darkening of the orb of day, more particularly when it is unlooked for, is calculated to impress a spectator with vague terror; even when expected, it fills the mind with awe, as a demonstration of the forces and motions of the mechanism of the universe. The sudden darkness, too, is impressive from its *strangeness* as much as from occurring by day; it resembles neither the darkness of night nor the gloom of twilight. The cone of the moon's shadow, though it completely envelops the spectator, does not, as we have explained, inclose the whole atmosphere above his horizon. The mass of uninclosed air accordingly catches the sunlight, and reflects it into the region of the total eclipse, making there a peculiar twilight. Stars and planets appear, and all animals are dismayed by the dismal aspect of nature.—See Mahoud-Bey's report of the total eclipse of July, 1860. Mr. Warren De la Rue, who was one of an expedition of scientific men who went to Spain to witness the same eclipse, gives the following account of the aspects of nature near the time of totality: "When the sun was reduced to a small crescent, the shadows of all objects were depicted with great sharpness and blackness, reminding one of the effects of illumination with the electric light. The sky at this period assumed an indigo tint, and the landscape was tinged with a bronze hue."—*Athenæum*, 1860, vol. ii., page 259. At totality, there was still light enough to enable the observer to draw without the aid of his lamp, while the sky near the sun presented a deep indigo, and thence passed through a sepia tint to red and brilliant orange near the horizon. It must be said, however, that the strange appearance

here recorded is exceptional, and probably not such as could ever occur in our latitude. There is one set of phenomena attending total E. of the sun, which are at once strange and invariable, and the causes of which cannot be said to be yet fully understood. As long as the total eclipse lasts, there appears round the sun and moon a luminous corona, while at its base, and projecting beyond the dark edge of the moon, appear very brilliant prominences, generally of a red color. These prominences were first observed during the total eclipse of 8th July, 1842; but they are found to be constant attendants on E., and methods have been invented of rendering them visible at any time without the interposition of the moon. The spectroscope reveals them to consist mainly of hydrogen gas in an incandescent state, and a comparatively narrow belt of the same color and substance runs round the whole circumference of the sun. The prominences are sometimes seen to shoot up like flames, in wild fantastic shapes, with incredible velocity, and to the height of tens of thousands of miles.

In the eclipse of 1860 the light of the corona was a silvery white, and it extended beyond the moon's limb about eight tenths of her diameter. The corona consisted first of a bright ring of about 2′ wide, and then an exterior and fainter ring of about 3′, beyond which, for a mean distance of about 2′, extended a glory of small rays—the whole corona extending to 7′ beyond the moon's limb. From the corona, at intervals, projected individual rays of remarkable size, and five in number: one of 9′ length; another of 14′, and shaped like the point of a star; a third, sabre-shaped, and extending 28′; a fourth, 28′; and a fifth, 10′. These individual rays are very differently described by different observers of the same eclipse, and are not well accounted for. The diffused light of the corona is believed to be caused by an immense extension of the gases forming the red envelope, only in a cooler and rarer condition.

4. *Prediction of Solar Eclipses.*—The period of 18 Julian years 11 days, referred to in treating of the prediction of lunar E., applies equally to solar E. with lunar; but the ancients, who understood that fact, could find no law of recurrence of solar E. within that period, so as to predict them. The reason of the failure is obvious; for though solar E. recur in a fixed order within the cycle, they are not visible at the same places on their recurrence as when first observed. By modern methods, however, E. of the sun may be predicted, with all their circumstances of time and places of observation, with the most perfect certainty. We shall not, however, attempt to explain what these methods are; suffice it that they resemble those already generally described as applied in the case of lunar E. At the time of a solar eclipse, the sun and moon are in conjunction; they are also in or near the same node; and no eclipse can happen if they are further than 17° from the node, or if the latitude of the moon, viewed from the earth, exceeds the sum of the apparent semi-diameters of the sun and moon. When within these limits, it is a problem of numbers and of spherical trigonometry to ascertain the nature of the eclipse, if any, which will happen.

The number of eclipses of the sun and moon together in a year cannot be less than two, or more than seven; the most usual number is four, and it is rare to have more than six. The explanation of the limitation of the number of E. is connected with the fact, that the sun passes by both nodes but once in a year, except in the case of his passing one early in the year, in which case, owing to the recession of the moon's nodes, he will again pass it a little before the end of the year. From the smallness of the cone of the moon's shadow, total solar E. are extremely unfrequent in any one place, compared with the frequency of their actual occurrence. At Paris there was only one total eclipse of the sun in the 18th c., that of 1724, and there will not be another till near the close of the 19th century. In London, not one total eclipse was witnessed during the 575 years, 1140–1715.

ECLIPSES OF THE SATELLITES. See SATELLITES.

ECLIP'TIC is the name given to the great circle of the heavens round which the sun *seems* to travel from w. to e., in the course of a year. It took its name from the early observed fact, that *eclipses* happen only when both bodies are in or near this path. A little attention about sunset or sunrise shows that the sun is constantly altering his position among the stars visible near him, leaving them every day a little further to the w.; and that this motion is not exactly e. and w., or parallel to the equator, becomes also evident by observing that the sun's height at mid-day is constantly altering. It is further observed that, twice a year, about Mar. 21 and Sept. 23, the sun is exactly on the equator. The two points of the equator on which the sun then stands are the equinoctial points, and are the intersections of the equator and ecliptic. Again, there are two days in the year on which the sun reaches his greatest and his least mid-day elevation: the first is the 21st of June; the second, the 21st of December. On these days, the sun has reached his greatest distance from the equator either way, and the points in his course where he thus seems to pause or halt in his retreat from the equator are called the solstices (*solis stationes*). These four points are distant from one another by a quadrant of the circle, or 90°. Each quadrant is divided into three arcs of 30°, and thus the whole ecliptic is divided into 12 arcs of that length, called signs of the zodiac (q.v.). These arcs or signs have been named after constellations through which the ecliptic passes. As the equinoctial points are not fixed, but recede yearly westwards about 50 seconds, and in a century about 1° 23′, the same constellations and signs that coincided

when the division of the ecliptic took place, no longer coincide. The constellation of the ram, for instance, which originally stood in the first arc or sign, now stands in the second, every constellation having advanced forward 30°, or a whole sign. Modern astronomers therefore pay little attention to these constellations and signs, but count longitudes from the existing spring equinoctial point from 0° to 360°.

Not only do the points change where the ecliptic and equator cross each other, but the angle of their inclination, called the obliquity of the ecliptic, is also variable. It is at present nearly 23½°, and is diminishing at the rate of about 50 seconds in a century. Were it to go on diminishing always, the ecliptic and the equator would at last coincide, and the earth would then have an everlasting spring. The decrease, however, has a limit; the obliquity oscillates between two definite bounds, which it can never pass. It has been calculated that it was at its greatest 2,000 B.C., and was then nearly 23° 53'. Since then, it has been decreasing, and will continue to do so till about the year 6,600 A.D., when it will be at its least, and about 23° 54'. These slight alterations cannot sensibly affect the seasons.

The physical cause of this change of the obliquity is the action of the other planets, especially Jupiter, Mars, and Venus, on the mass of the earth. The fact of the change was known to astronomers in very ancient times; Herodotus mentions an old tradition of the Egyptians, that the ecliptic had formerly been perpendicular to the equator—a notion into which they were most probably led by observing, for a long series of years, that its obliquity was constantly diminishing. There can be little doubt that the Chaldeans arrived at the epoch of 403,000 years before the entry of Alexander into Babylon, to which they proudly referred for their first astronomical observations, by computing the time when the ecliptic was perpendicular to the equator, on the supposition of its obliquity diminishing 1′ in 100 years. Though it was not till after the discovery of the law of gravitation that the change on the obliquity could be explained, yet that it was changing was believed in by many astronomers, although some doubted whether the differences in the values at different times were not due to errors of observation. The earliest known measure of the obliquity of the ecliptic was made by Tcheou Kong, the regent of China. Among the western nations, the earliest measurements were made by Pytheas and by Eratosthenes.

ECLOGUE, usually designates a pastoral poem in which are related the loves and adventures of shepherds and shepherdesses in some ideal scene and period. The name is sometimes applied to Virgil's *Bucolics*. Spenser is perhaps the leading English poet in eclogues—a species of composition now out of date.

ÉCOLE POLYTECHNIQUE is one of the most celebrated military academies in France. In 1793, all the public establishments in Paris were in a convulsed state, owing to the revolution. In 1794, M. Lamblardie, director of the *Ponts et Chaussées*, proposed the establishment of an *Ecole Centrale des Travaux Publics*, to educate young men for military, naval, and civil engineering. Monge and Carnot favoring his plan, it was carried out, and a school established at the palais Bourbon. The first list of professors comprised names which afterwards acquired European celebrity—including those of Lagrange, Prony, Monge, Hachette, Hassenfratz, Fourcroy, Vauquelin, Berthollet, Chaptal, Pelletier, Guyton-Morveau, and Merimée. In 1795, the name was changed to E. P.; many alterations were made in the organization; artillery studies were included in the course; and the pupils were ordered to wear a uniform. When Napoleon went to Egypt, 40 pupils from the E. P. accompanied him, many of whom greatly distinguished themselves. Napoleon made the organization of the school more strictly military in 1804, to identify it more fully with the army. The school was dissolved in 1816, again in 1830, and again in 1832, on account of the impetuous way in which the pupils mixed themselves up with the political disturbances of those years; but as the school suited the military genius of the French nation, it was re-established on each occasion, after the restoration of tranquillity. Candidates can be admitted only by competitive examinations, which take place yearly. A proclamation from the war office, made public before the 1st of April, informs intending competitors of the subjects on which they are to be examined, and the time when the examinations begin. To be eligible as a candidate, the youth must be French, and must be more than sixteen, and less than twenty years of age before the 1st of Jan. following; but soldiers are admissible up to the age of twenty-five, provided they can give proof of two years of service in the regular army. The cost of board alone is 1000 francs (nearly £42) a year. A complete course of instruction lasts for two years; when the pupils who have satisfactorily passed the final examinations have the privilege of choosing, from among the various public services supplied from this school, the particular branch they wish to enter, such as artillery, engineers, the staff, the department of telegraphs, or some of the other government monopolies. The school was reorganized by a decree of the 15th April, 1873.

ECONOMY, a socialist village of Pennsylvania, in the United States, stands on the right bank of the Ohio, about 17 m. below Pittsburg. The settlement was planted in 1825 by immigrants from Germany. The inhabitants own everything in common—3,500 acres of land, upwards of 100 houses, a church, a school, a museum, and manufactories of wool, cotton, and silk. Pop. of township, '70, 1324.

ECONOMY, POLITICAL. See POLITICAL ECONOMY.

ÉCORCHÉ. A figure in which the muscles are represented, stripped of the skin, for purposes of artistic study, is called by the French an É., and from them we have borrowed the term. From a portion of the figure the upper muscles are also removed, so as to exhibit those which lie nearer to the bone. It is not uncommon to represent the É. in action, in the form of the fighting gladiator. The first person who did so was Salvage, a French artist and anatomist. To render the studies of pupils more complete, Salvage had this figure engraved in all the points of view, and more or less denuded of flesh, till at last it was little more than a skeleton, the only muscles represented being those which immediately cover the bones. Figures of this kind can now be procured both in plaster and papier-mâché.

ÉCOUTES (Fr. *écouter*, to listen), in military operations connected with siege-works, are listening-places. They are small galleries, excavated at regular distances, and going out beneath and beyond the glacis, towards the lines and batteries of the besiegers. Their purpose is, to enable the garrison to hear and estimate the works being carried on by the sappers and miners of the enemy.

ECRASEUR, the name of a long steel instrument, invented a few years ago by a distinguished French surgeon, M. Chassaignac, and consisting of a fine chain, which, passed round any structure—as the base of a tumor, for example—gradually constricts it, and finally crushes its way through it by means of a screw or rack for tightening it, which is worked at the end of the handle. The advantage of this instrument over the knife is, that it causes little or no bleeding, the torn vessels spontaneously contracting and closing. It is specially applicable to cases of cancer of the tongue, piles, polypi, and various kinds of tumors. When a solid mass—as, for example, a considerable portion of the side of the tongue—is to be removed, the chain is sometimes pressed through the center, and made to cut two lines successively in the form of a V, in which the diseased structure is included. As the pain which is caused by this instrument is very great, the patient should be placed completely under the action of chloroform before it is applied.

ECRICOK', or **ICRICOK**, a t. of Guinea, the capital of a petty chief, on the Old Calabar river, about 100 m. from its mouth. The river is here about a mile broad. The town consists of mud-houses, erected on platforms.

ECSTASY (Gr. *ekstâsis*, a transposition, a change of situation or condition; applied to the mind in the sense of a state in which it is altered or fundamentally changed in character by some absorbing emotion), a word applied to those states of mind, which, without amounting to insanity (q.v.), in respect of the temporary character of the affection, are marked by mental alienation, and altered or diminished consciousness. A person in ecstasy may be violently moved, or completely passive; convulsed, or rigid, or flaccid in all the limbs; silent, or uttering unmeaning or excited language, or assuming the character of a prophet or inspired person; having, or not having intelligence of what is going on around him. The varieties are infinite, because this morbid state of the mind is nothing more in reality than the fixing of it in a particular attitude, as it were, in connection with an overmastering idea, emotion, or sensation, which causes all other external phenomena to be disregarded. Perhaps the most common form, or, at all events, that which is best known, is religious ecstasy closely allied to monomania and religious delusion of every kind; often simulated, but also occurring as a real disease, as in the case of those "struck" in revival meetings, and in the older histories of the conversions of Cambuslang, the *convulsionnaires* of St. Médard, and the epidemics of religious excitement mentioned under dancing mania (q. v.). It is also common to speak of the ecstasy of terror, and the expression is correct in exaggerated cases, where fear completely paralyzes both the consciousness and the power of motion and expression; so also there is an ecstasy of joy, of love of hate, of meditation; and in some physical states as catalepsy (q.v.), hysteria (q.v.), mesmerism (q.v.), a true ecstasy is one of the phenomena, inasmuch as the proper consciousness of the individual is temporarily abolished, or so much changed in character as to lead almost to the loss of the sense of personal identity. Some of the cases of presumed double consciousness (q.v.) are no doubt of this kind; and generally the same may be said of the state of the mind in many dreams and visions, and also in somnambulism (q.v.). A striking picture of this form of ecstasy is the well-known sleep-walking scene in *Macbeth*, where the lady's mind is so completely preoccupied with the supposed blood stain on her hands, that though her eyes are open, we are told that "their sense is shut," and the mind is also excluded from all the ordinary avenues of communication.

ECTHY'MA is a pustular disease of the skin, in which the pustules often reach the size of a pea, and have a red, slightly elevated, hardish base. In the course of two or three days after the appearance of the pustule, it is replaced by a scab, which adheres firmly to the base, and is somewhat concave. On its removal, a deep red mark, a new scab, an ulcer, or a healed scar remains. The disease may be acute or chronic. The acute form is ushered in by slight constitutional, not amounting to febrile, symptoms, and by a burning or pricking pain at the seat of the eruption, which is usually confined to the neck and shoulders. The disease runs its course in 10 days or a fortnight. In chronic ecthyma, the pustules which follow in crops (often for several months) are

usually scattered over the extremities. This form of eruption indicates a low state of the system. It sometimes follows the acute disease, and not unfrequently is a tertiary symptom of syphilis. Pustules, which in no respect seem to differ from those of ecthyma, are produced by various local irritants. Thus the affection of the hands, popularly known as the *grocer's itch*, is produced by the irritation of brown sugar, perhaps by the *acari* which are so often present in it. Stone-masons are said occasionally to suffer from a similar disease. With regard to *treatment*, the acute form would in most cases doubtless disappear in the course of a fortnight, if left entirely to itself: but as the bowels are usually disordered, an occasional alterative aperient, as a few grains of gray powder with a little rhubarb, may be prescribed, and tepid water applied locally gives great relief. The patient should, moreover, be kept on a moderately good, nutritious diet. In the chronic form of the affection, a meat diet and the use of wine or porter are essential; while tonics, such as a combination of bark and nitric acid, are called for. Tepid baths are often useful, and if there is sleeplessness, an opiate should be taken at or shortly before bedtime.

ECTOZO'A (Gr. *ektos*, without, and *zoos*, living), a term which has been introduced, as in contradistinction to *Entozoa*, to designate those parasitic animals which live upon the external parts of other animals, as lice, tics, etc. Such also are many of the entomostracous crustaceans, parasitic upon fishes. It is a question of much importance, not yet satisfactorily answered, if any of these creatures are the causes of diseased states, in connection with which they are sometimes found in particular abundance, or if their presence in unusual numbers is to be ascribed to disease previously existing.

ECTRO'PION (Gr. *ek*, and *trepo*, I turn out), an everted condition of an eyelid, in consequence of which it does not cover the globe of the eye. It can be remedied by a slight surgical operation.

ECTRO'TIC (from Gr. *ectroma*, abortion), a term applied to methods of treatment which aim at preventing the development of a disease.

ECTYPOG'RAPHY, a method of etching, in which the lines are raised on the plate, in place of being sunk into it. See ETCHING.

ECTYPUM, a cast in relief of an ornamental design, produced from a mold.

ECUADOR', the Spanish term for *equator*, is the name of an independent state of South America, extending from lat. 1° 40′ n. to 5° 50′ s.; and from long. 70° to 81° 20′ west. It measures, therefore, from n. to s. fully 500 m., and from e. to w. nearly 800, presenting an area of about 250,000 sq. miles. It is bounded on the n. by the United States of Colombia, on the e. by Brazil, on the s. by Peru, and on the w. by the Pacific ocean. Toward the e. it is drained by the Amazon, which receives all the rivers that fall down the eastern slopes of the Andes, while the country w. of the Andes is drained chiefly by the Mira, the Esmerelda, and the Guayaquil—the last named being more available for navigation than any other on the same coast of South America. The country is traversed nearly in the line of a meridian, by the two ranges of the Andes, which, alternating between union and separation, sometimes run into what are called knots, and sometimes inclose, at great elevations, plateaus or table-lands. Among these last, ranging from s. to n., the most important are those of Cuença, Hambato, and Quito—their respective heights above the sea being, in feet, 8,640, 8,860, and 9,543. Lofty as these plateaus or table-lands are, they are beset, nay almost shut out from the world, by pinnacles of occasionally more than equal altitude above their own level. Of these the most remarkable are Chimborazo and Cotopaxi (q.v.). In connection with these physical features, the country is subject to volcanoes and earthquakes—the latter frequently occurring, and the former numbering altogether no fewer than sixteen. The climate comprises every possible variety. Hyperborean cold marks the snow-capped mountains; a temperature at once moderate and uniform renders the upland plains so many paradises; while, on both sides of the dividing ridge, intense heat oppresses the lower valleys. The rainfall is different in different localities. In the basin of the Guayaquil, there is regularly a wet season; between it and cape San Lorenzo, almost perpetual drought prevails; and, in the other direction, the upper tributaries of the Amazon are said to be fed by almost perpetual rains.

The population, according to the latest estimates, amounts to about 1,300,000, comprising 600,000 white descendents of Europeans, 650,000 Indians (200,000 Indian savages), 8,000 Africans, and 35,000 Mestizoes. The chief cities are Quito, the capital, and Guayaquil, a great commercial emporium; and the towns of the second class are Riobamba, Puno, Cuença, and Loxa. The government appears to have been constituted on the model of the United States of North America, having a president and vice-president, with a senate and a house of representatives. The foreign trade of E. is carried on chiefly through the port of Guayaquil, the imports of which in 1873 amounted to £950,000. In 1876, the value of the exports was £680,000. In the year 1874, there entered and cleared the port of Guayaquil 154 British and 221 other vessels, of a total tonnage of 331,683 tons. The principal exports are cocoa, the precious metals, timber, bark, hides, etc. The principal articles of import, in order of value, are cottons—more than a fourth of the whole—woolens, wines, spirits, groceries, soap

and candles, hardware, flour, etc. A few cart-roads have recently been made, and a railway was in 1877 being laid down between Puebla and Sibambe.

ECUMENICAL (Gr. *oikoumenikos*), i.e., universal, a term applied to ecclesiastical councils, regarded as representing the whole Christian church, or the church of the whole world (*oikoumenè*), and to the orthodox or Catholic church, regarded as opposed to heretical and merely local sects. The Roman Catholics claim the designation as appropriate to their own church. It is a title of patriarchs, archbishops, and ecclesiastical superintendents of provinces.

EC'ZEMA (from a Greek verb, "to boil out"), an eruption of small vesicles on various parts of the skin, usually crowded together, with little or no inflammation around their bases, and unattended by fever.

EDAM, a t. in North Holland, lies 12 m. n.n.e. from Amsterdam. It has seven entrances, and lies within a green dyke, ornamented by two rows of elm-trees. There is an extensive trade in wood and cheese. The principal industries are ship-building, rope-spinning, sawing wood, tanning leather, etc. There are a Lutheran, a Baptist, a Roman Catholic, and two Reformed churches, one of the latter having beautiful painted windows. In 1864, pop. 5,180; in 1876, 5,361.

ED'DA. There are two works which bear this title—the *Edda Sæmundar hins Froda*, or Edda of Sæmund the wise, and the *Edda Snorra Sturlusonar*. The former and older of these is a collection of the most ancient mythological and heroic Scandinavian songs, the date of whose composition may probably be referred to different periods between the 6th and 8th centuries. These songs, which are supposed to have been collected and arranged by Sæmund Sigfusson, surnamed Frodi, an Icelandic priest, who was born in 1054, and died in 1133, were discovered and first brought before the notice of European scholars in 1643, by Brynjolf Sveinsson, bishop of Skalholt, who applied to them the name of Edda, or "grandmother." This collection was published entire at Stockholm, 1818, by A. A. Afzelius, after the text of prof. Rask; and at Copenhagen, in 1787–1828, with a Latin translation, glossaries, etc. The third volume of this edition, which was completed by prof. Finn Magnusen, consists chiefly of a very learned and copious lexicon mythologicum by the editor. Complete editions of the text of this E. were also published by Munch and Möbius, but all former editions have been superseded by the editions of prof. Bugge of Copenhagen (1867) and of Svendl Grundtvig (1868–74). Hildebrand's text (1876) is founded on theirs. Simrock made a German translation of both Eddas in 1851; and both Ettmüller and the brothers Grimm have translated a part of Sæmund's Edda. The Snorra Edda is a prose composition, and treats of Scandinavian mythology and of the language and modes of composition of the ancient skalds. As the name implies, it is referred to Snorri Sturluson (q.v.), the learned author of the *Heimskringla*, who was born in Iceland in 1178, and died by assassination in 1241, on his return from Norway, where he had lived in the capacity of skald or court-poet. This E. was first published by P. J. Resen in 1665, under the title *Edda Islandorum An. Chr.* MCCXV. *Conscripta per Snorronem Sturlæ*, etc. A complete edition of the prose E., and the most copious of all, was published at Stockholm by prof. Rask in 1818. The trustees of the Arna-Magnæan legacy in Copenhagen have published an elaborate edition, with a Latin translation and notes; and a German edition of both Eddas, with glossary, etc., was published in 1859 by Lüning. A complete English translation of the poetical E., by Ben. Thorpe, was published in 1866. The best English translation of the mythological part of the prose E. is found in a translation of Mallet's *Northern Antiquities*, edited by Blackwall (1847).

ED'DOES. See Cocco

ED'DYSTONE, a group of gneiss rocks, daily submerged by the tide, in the English channel, 9 m. off the Cornish coast, and 14 m. s.s.w. of Plymouth breakwater. The rocks lie in lat 50° 10′ 54″ n., and long. 4° 15′ 53″ e., and have 12 to 150 fathoms water around. The frequent shipwrecks on these rocks led to the erection of a light-house on them by Mr. Winstanley, 1696–1700. It was a wooden polygon, 100 ft. high, with a stone-base; but a storm in 1703 completely washed it away, with the architect. Another light-house was built, 1706–9, also of wood, with a stone base, and 92-ft. high, by Mr. Rudyerd, a silk-mercer. This erection was burned in 1755. The present building, known as the Eddystone light-house, and noted for its strength and the engineering skill it displays, was constructed by Mr. Smeaton in 1757–59, on the model, it is said, of the trunk of the oak-tree. It stands on the sloping side of one of the rocks, and is built of blocks, generally one to two tons weight, of Portland oolite, encased in granite. The granite is dovetailed into the solid rock. The whole forms a circular tower 85 ft. high; the base is 26¾ ft. diameter, and has 13 ft. of solid masonry on it, and the tower contracts to 15 ft. diameter at the top. The light, a fixed one, 72 ft. above the water, is seen at the distance of 13 miles. As the rock on which the tower stands is worn and greatly weakened, the light-house is to be taken down and rebuilt, on another part of the reef. See LIGHT-HOUSE.

EDELINCK, GERARD, a celebrated engraver, b. at Antwerp, 1627; d. in Paris in 1707. He was patronized by Louis XIV. All his works are executed with the graver with admirable clearness and precision.

EDEN, a river rising in the e. of Westmoreland, in the Pennine chain. It runs n.n.w. through the e. of Westmoreland and Cumberland, past Appleby and Carlisle, and ends in a fine estuary at the upper part of the Solway firth, after a course of 65 miles.

EDEN, according to the Hebrew Scriptures, the first residence of man. The description given of it in the book of Genesis is brief, obscure, and in appearance legendary. The allegorical theory will be noticed under Fall (q.v.). In general, however, scholars have preferred to understand the story literally, and to believe that the writer or writers of it meant it to be so understood; but they have not, therefore, been unanimous as to the historical reality, or even the geographical position of Eden. The difference in their modes of apprehending the contents of the Hebrew Scriptures has manifested itself in this as in other *vexatæ questiones* of biblical criticism. Josephus and several of the fathers conceived that Eden was a term denoting the entire region between the Ganges and Nile; Calvin, Huet, Bochart, Wells, etc., have, with slight differences of detail, concluded in favor of Kornah in Babylonia, not far from the Persian gulf; Reland, Calmet, Hales, Faber, J. Pye Smith, in favor of Armenia, near the sources of the Tigris and Euphrates; Le Clerc, in favor of the region near Damascus; while the modern German school of biblical critics, convinced that the Hebrew account is traditional, and, in its present form, of very late composition, and impressed, besides, with the vast antiquity of the far east, have, almost without exception, turned their eyes in that direction, and sought the cradle of the human race in Bactria or Cashmere, or the region lying to the n. of it, a part of which is to this day called Audyana, the "garden." It may also be mentioned that the Mohammedans believe E. to have been in one of the seven heavens—some say the moon—and that the expulsion from paradise consisted in Adam being cast down upon the earth after the fall. It is useless seeking to identify the river system of E. with anything known at present. There is no river on the face of the globe of which the Euphrates and Tigris (Hiddekel) are separate "heads" (whether this means "sources" or "channels"), as they are said to be in the 2d chapter of Genesis, for, as maj. Rennell has shown, although the Euphrates and Tigris *now* unite, for a short space on their way to the Persian gulf, yet, until the time of Alexander the great, they kept entirely distinct courses; and therefore it has been assumed that the "deluge" completely altered the physical character of the region denoted by the term Eden. This was Luther's notion, to which, however, it has been objected, that the narrative in Genesis is so worded as to convey the idea that the countries and rivers spoken of were still existing in the time of the historian. Besides, the science of geology has thrown so much doubt on the universality of a deluge so late as the period assigned to Noah, that it is hazardous to argue on the hypothesis of any extensive physical changes having taken place since the first appearance of man on the planet; at least, if that be dated only some 6,000 years back. It will thus be seen that the question of the locality of E., or of the exact sense in which the Mosaic narrative is to be understood, is involved in inextricable mystery; and it has become a general opinion, that the spiritual significance of this primeval story is what principally concerns Christians—an opinion which derives force from the total silence of the New Testament in reference to the subject.

EDENKOBEN, a t. of Rhenish Batavia, in the circle of Pfalz, 6 m. n.n.w. from Landau. It has a station on the Mannheim and Strasburg railway. It is surrounded by vineyards, which produce much wine, but not of very good quality. Chestnuts are also produced in large quantities in the neighborhood. There is a bathing establishment at E., also several mills and manufactures of fire-arms. It has important grain markets. Near it are the royal villa of Ludwigshohe, and the church and tower of the ruined convent of Heilsbruck. Pop. '75, 4,889.

EDENTA'TA (Lat. toothless), an order of *mammalia* established by Cuvier, and generally received by naturalists. Cuvier remarks, that "although brought together by a purely negative character," the E. have, nevertheless, "some positive mutual relations, particularly in the great claws which encompass the ends of their toes, and which more or less approximate to the nature of hoofs; also in a certain slowness or want of agility, obviously arising from the peculiar organization of their limbs." He included among them, however, the *monotremata*, which, although so few in number, are now generally separated, on account of the very important differences of organization which characterize them. The remaining E. are divided into two tribes—1. *Tardigrada* (slow-paced), containing only the sloths; and, 2. *Effodentia* (diggers), containing armadillos, pangolins, ant-eaters, etc. The ant-eaters and pangolins are the only E. that are absolutely destitute of teeth; but none of the order have any teeth in the forepart of their jaws, and their teeth are comparatively imperfect in structure, being destitute of enamel and distinct roots. The sloths alone subsist on vegetable food, the rest chiefly on insects or on animal substances in a decaying state. The whole number of existing species of E. is not great; but they appear to have been more numerous and of much greater size in a former geological period, as the remains of the *mylodon*, *megatherium*, and *megalonyx* testify.

EDES'SA (modern name, *Urfah*, or *Orfa*), a very ancient city, on the river Daisan, in the n. of Mesopotamia, 78 m. s.w. of Diarbekir, although the Christian or Mohammedan legend, ascribing its foundation to Nimrod, or Khabiba, a female contemporary of Abraham, is unworthy of any credence. With the conquest of Persia by the Greeks,

the history of E. first becomes clearer. Seleucus, in particular, is said to have done much for the aggrandizement of the city. Christianity was introduced into E. at an early period. In the reign of Trajan, the place was made tributary to Rome, and in 216 A.D., became a Roman military colony, under the name of *Colonia Marcia Edessenorum*. During this period its importance in the history of the Christian church continued to increase. More than 300 monasteries are said to have been included within its walls; it was the seat of Ephraim Syrus and his school, and played an important part in the Arian and other controversies. With the extension of the religion of Islam, E. fell into the hands of the Arabian caliphs. Christianity declined, and wars at home and abroad during the caliphate, destroyed likewise its temporal splendor and prosperity, till, in 1040, it fell into the possession of the Seljuk Turks. The Byzantine emperors succeeded in recovering E., but the viceroy contrived to make himself independent. He was, however, hard pressed by the Turks, and this rendered it easy for the crusader Baldwin, the brother of Godfrey of Bouillon, to gain possession of the city (1097 A.D.), and make it the capital of a Latin principality, and the bulwark of the kingdom of Jerusalem. Under the Frankish princes, E. held out valiantly against the Mussulmans, till at length Zengi, ruler of Mosul, succeeded in taking the town and citadel in the year 1144, when all the Christian churches were converted into mosques. An attempt made by the inhabitants to throw off the Turkish yoke, completed the ruin of E.; the Edessenes were defeated by Nur-ed-din; and all who were not massacred, were sold as slaves. After many vicissitudes, in the course of which E. fell successively into the hands of the sultans of Egypt, the Byzantines, the Mongols, Turkomans, and Persians, the city was finally conquered by the Turks, and has ever since formed a portion of the Turkish dominions. It now contains 40,000 inhabitants, of whom 2,000 are Armenian Christians; the rest are Turks, Arabians, Kurds, and Jews. At present, E. has numerous mosques and bazaars; manufactures of cotton goods, goldsmiths' wares, and morocco leather, commerce in British manufactures obtained by way of Aleppo, and a large trade in corn, etc., with Syria. E. is regarded by the easterns as a sacred city, because they believe it to have been the residence of Abraham.

EDES'SA, formerly known as ÆGÆ, the ancient capital of Macedonia, 46 m. w. of Thessalonica, at the head of a defile commanding the approaches from the sea-coast to the interior. It was the original residence of the Macedonian kings, and was the burial-place of the royal family long after it ceased to be the seat of government. In Edessa Philip II. was murdered by Pausanias, 336 B.C. The greater Alexander was buried at Memphis, but Edessa remained the royal burial-place, and when Pyrrhus occupied the place, the royal tombs were plundered by his Gallic mercenaries. The modern city of Vodena is built on the site of Edessa, and some remains of the ancient buildings are preserved.

ED'FOU (Coptic, *Atbô;* Egypt. *Hut;* anc. *Apollinopolis Magna*), a t. of upper Egypt, is situated on the left bank of the Nile, in lat. 25° n., and long. 32° 45' east. It contains the remains of two temples, which are considered the finest remains of antiquity in Egypt. The larger of these temples was commenced by Ptolemæus Philometor 181 B.C., but does not appear to have been completed till the reign of Claudius. There appears, however, to have been a temple there in the reign of Thothmes III. Its length is about 400 ft., its breadth 150. Its entrance is by a gateway 50 ft. high, between two immense truncated pylones, 37 ft. wide at the base, and 114 ft. high. These are adorned with masterly sculptures. Passing through this entrance, the court is reached; it is 161 ft. long, and 140 ft. wide, inclosed by a splendid colonnade of 32 pillars, each differing in design, and surrounded by walls, between which and the pillars there is a stone roof, forming a covered portico. The interior of this court is to a great extent filled up with rubbish, and occupied by wretched dwellings, many of which also are built upon the roof of the temple. Within the temple, there are several chambers, one of which, about 33 ft. by 17, contained the image of the deity; in it was also a zodiac. The effect of the whole is grand and imposing, impressing the mind with the harmony and perfect beauty of the design. An inscription on the outer wall recorded the endowment of the temple by Ptolemy Alexander I., and Darius, Nectanebo, and Nectanebes II. The smaller temple, erected by Physcon and Lathyrus, consists only of two chambers. Its walls are covered with hieroglyphics representing the life of *Horus*, the son of *Kneph* and *Athor*, who were worshiped in the great temple. These temples have been lately entirely cleared by Mariette. E. has at present a population of about 2,000. Its manufactures are blue cotton cloths, and earthenware similar to the ancient Egyptian pottery.—Wilkinson, *Modern Egypt*, p. 274; Brugsch, *Reiseberichte*, p. 225; Lepsius, *Egypt and Ethiopia*, p. 117.

EDGAR, a co. in e. Illinois, on the Indiana border, drained by affluents of the Wabash, and intersected by the Indianapolis and St. Louis railroad; 580 sq.m.; pop. '70, 21,450. It has a level surface of prairie and timber land, and fertile soil. The chief productions are corn, wheat, oats, butter, and wool. Co. seat, Paris.

EDGARTOWN, a village and port of entry in Dukes co., Mass., 75 m. s.s.e. of Boston; pop. '70, 1516. The port is on the e. side of the island, and has a well-sheltered harbor. There is daily communication with the mainland at Falmouth. Near Edgartown is a

grove which has become famous for Methodist camp-meetings, at which sometimes as many as 20,000 people attend. Navigation and fishing are the principal occupations.

EDGECOMBE, a co. in n.e. North Carolina, on Tar river, intersected by a branch of the Wilmington and Weldon railroad; 600 sq.m.; pop. '70, 22,970—15,112 colored. The surface is generally level, and the soil light and sandy. The chief productions are corn, cotton, and turpentine. Co. seat, Tarboro.

EDGECUMBE.—1. A bay in the e. coast of Australia, lies within the province of Queensland, near lat. 20° s., and long. 148° east. It is sheltered on every side but the north, its east barrier terminating in cape Gloucester.—2. A mountain in what was formerly Russian America, marks the n.w. point at the mouth of Norfolk sound, which connects the settlement of New Archangel on the island of Sitka with the open ocean. It rises from the water's edge as an almost perfect cone, which, during nearly the whole year, is capped with snow. It has been an active volcano within the recollection of some of the Russian colonists; and, even at the present day, the neighborhood presents indications of subterranean energy, such as tremblings of the earth, hot springs, and eruptions of smoke and ashes. See AMERICA.

EDGEHILL, BATTLE OF. The first great battle of the civil war was fought on Sunday, 23d Oct., 1642, between the royalist forces under Charles and the parliamentarians under the earl of Essex. It was the intention of Charles, who had been lying at Shrewsbury, to march upon London by Wolverhampton, Birmingham, and Kenilworth; and Essex, who had thrown himself into Worcester, on being informed of the king's plans, marched forward to intercept him, and entered the village of Keinton, in Warwickshire, on the evening of the 22d. On the following morning, the royalist army was discovered a little in advance, and drawn up in order of battle on the elevation of Edgehill. The king's forces had the advantage in numbers and in cavalry, as well as in position; Essex, however, had the more formidable train of artillery. Charles had commanded that hostilities should be delayed until the enemy should open fire; accordingly no movement took place till about two o'clock, when Essex commenced the fight by firing upon the royalists, who immediately replied with their cannon. The royalists then began to descend the hill, and prince Rupert, who led the right wing, charged with his cavalry the left wing of the parliamentarians, broke it, and pursued it madly to Keinton, where his men, regardless of the main army, busied themselves in plunder. This was the fatal movement of the day. The right wing of the parliamentarians had charged and recharged with the greatest success, until, after some stubborn fighting around the royal standard, the royalists broke, and retreated toward the hill. That night 4,000 men lay slain at the foot of Edgehill, and of these the greater number were royalists.

EDGEFIELD, a co. in w. South Carolina, on the Savannah river, by which it is separated from Georgia, traversed by the South Carolina, the Charlotte, Columbia and Augusta, and the Greenville and Augusta railroads; 1150 sq.m.; pop. '70, 42,486—25,417 colored. The surface is hilly, and the soil moderately fertile, producing corn, cotton, etc. There is abundant water-power, and a number of mills and factories. Co. seat, Edgefield Court House.

EDGEWORTH, MARIA, the daughter of Richard Lovell Edgeworth, of Edgeworthstown, co. of Longford, Ireland, was born at Hare Hatch, near Reading, Berkshire, in the year 1767. In 1782, her father returned to Ireland, accompanied by his family, to whose education he earnestly devoted himself. Maria's talents quickly developed themselves. Her first literary effort was written in conjunction with her father, and was entitled *Essays on Practical Education* (1798). In 1801 appeared the *Essay on Irish Bulls*, which was also in part the work of Mr. Edgeworth. But it was in the sphere of fiction that Miss E. won her greatest triumphs. In 1801, she published *Castle Rackrent*, the first of a pretty extensive series of novels characterized in general by a quiet, agreeable humor, excellent sense, and lively delineation of character and manners. It has been objected by critics, however, that some of them are too manifestly didactic to please as fiction should please. In 1803 appeared *Belinda;* in 1804, *Popular Tales;* in 1806, *Leonora;* in 1809, *Tales of Fashionable Life;* and in 1812, a second series of the same. The last of the series was "Helen," which was published in 1834. Among the most successful of her *Tales of Fashionable Life* were "Ennui" and "The Absentee." Miss E.'s stories for children—the last of which, *Orlandino*, appeared in *Chambers's Library for Young People*—are deserving of high praise. This gifted and universally respected authoress died at Edgeworthstown, 21st May, 1849.

EDGEWORTH, RICHARD LOVELL, 1744–1817; b. Bath, England; the father of the celebrated authoress Maria Edgeworth, and associated with her in literary labors. He was an intimate friend of Dr. Erasmus Darwin. Among his writings are *Professional Education; Practical Education; Essay on Irish Bulls;* and autobiographical memoirs.

EDGINGS are indispensable to neatness in gardening, except where parterres are cut out of a lawn, but more especially to separate gravel-walks from cultivated ground. They are sometimes made of stone or of deal; sometimes of ornamental wicker-work, and now not unfrequently of wire-work; but for many purposes, the best edgings are formed of low-growing evergreen plants, and none are so common in Britain as those

of dwarf-box, which, when carefully trimmed, are very pleasing to the eye, and do not require renewal for a number of years. Thrift or sea-pink is another not uncommon edging, is beautiful at all times, and particularly so when in flower, but requires frequent renewal. The double daisy, often planted as an edging, also requires frequent renewal. Turf-edgings are sometimes employed for wide flower-borders.

ED'IBLE BIRDS' NESTS, or EDIBLE SWALLOWS' NESTS. See NESTS, EDIBLE.

EDICT (Lat. *edictum*). The power of making edicts (*jus edicendi*) belonged generally to the higher magistrates at Rome; but it was by the curule ædiles, and more extensively still by two prætors—the *prætor urbanus*, and the *prætor peregrinus*—that it was prominently exercised. In a province, the jurisdiction of the prætor passed to the *præses*. As this power was co-extensive with the possession of what were called the honors (*honores*), it was frequently spoken of as the *jus honorarium:* and from its being exercised chiefly by the prætors, it was also known as the *jus prætorium*. The edicts of the prætors are mentioned by Gaius among the sources of the Roman law; but, strictly speaking, they are to be considered as rules promulgated by the magistrates on entering on office, rather than as expressions of the will of the Roman people, either direct or indirect. The E. of one prætor was not binding on his successor, but very often edicts were adopted and confirmed, and this came gradually to constitute a very important body of law. They were frequently known by the names of their first promulgators, though they were often named with reference to the formula and the *actio* which they established. The power of promulgating edicts is supposed to have flowed down from the kings to the consuls, and through them to the prætors, and thus to have formed part of what we should call the royal prerogative. Even in Cicero's time, the study of the E. had become a regular branch of the study of the law. In 67 B.C., the Lex Cornelia provided against the abuse of passing edicts for the decision of particular cases by requiring the prætors to decide in conformity with the edicts which they promulgated with reference to their whole tenure of office, which were known as perpetual edicts. Servius Sulpicius, the friend of Cicero, addressed to Brutus a work on the subject; and Ofilius made what was probably a compilation of the various edicta, resembling the subsequent one by Julian. The object of the E., according to the Roman jurists, was to aid, supplement, and correct the civil law, and to render it more conducive to the public service, and they speak of it as "the living voice of the civil law." It was, in short, an indirect form of legislation, which public opinion had sanctioned for the public convenience; and there can be no doubt that it contributed what was ultimately the most valuable part of the Roman law. There were many commentators on the edicts under the emperors, amongst whom Labeo is mentioned and cited by Ulpian (*Dig.* 4, tit. 3, s. 9). Julian is supposed to have collected and arranged the edicts, and given to them a systematic form. Gaius, Ulpian, and Paulus composed treatises on the edicts of the curule ædiles; and it is chiefly from the writings of these and the other jurists excerpted in the *Digest*, that we know anything of the character of the E., the portions of it which have been preserved being mere fragments. They have been collected by Wieling in his *Fragmenta Edicti Perpetui* (Frank. 1733).

EDICT OF NANTES. See NANTES.

EDIC'TAL CITATION, or INTIMATION. By the former practice of Scotland, where the party to be cited before a civil court was out of Scotland, the citation required to be given by a messenger-at-arms making proclamation at the market-cross of Edinburgh, and at the pier and shore of Leith. The idea, of course, was, that the fact was thus more likely to reach the absent party than if it had been intimated or published in any other manner.—Erskine, b. i. tit. 2, s. 18. But the practice in this matter was altered by the so-called judicature act (6 Geo. IV. c. 120), and the subsequent statute, 13 and 14 Vict. c. 36, s. 22, which enacted that services against persons forth of Scotland should be done by delivery of copies at the record office of the keeper of the records of the court of session. Abstracts of the copies delivered to the keeper are ordered to be recorded by him, and to be printed periodically at the end of each successive 14 days, and the record is to be at all times open for inspection. In criminal cases, the old forms still remain unaltered.

EDINBURGH, the capital of Scotland, and chief town in the co. of Mid-Lothian, occupies a picturesque situation on a cluster of eminences, at a distance of about a mile and a half from the firth of Forth (q.v.), which is here about 6 m. in breadth. The outskirts extend almost to the shore, and a connection has thus been formed on the n. with Leith, the ancient port; Newhaven, a fishing village; and Granton, a modern and rising port. The admirable position of E. has induced the comparison with Athens, from which, as well as its literary fame, it takes the title "Modern Athens." The Gaelic name of the city is "Dunedin."

The castle, which crowns the highest point in the city, was undoubtedly built first, a town gradually forming on the top and sides of the ridge, which slopes downwards to the east. For some centuries the city was confined entirely to this ridge or hill, and was flanked on the n. by a lake or marsh called the Nor' Loch. The remaining means of defense was a wall built by the citizens about the middle of the 15th c., a few relics of which, of different eras, still exist. E. was therefore a fortified town, protected by

the castle at its western extremity. When David I. was induced by his piety and munificence to found the abbey of Holyrood in the low ground eastward of the city, he at the same time empowered the canons of this religious house to found a burgh in a westerly direction towards the city of E., and thus was built the Canongate, afterwards united to the city. The beautiful abbey itself has been a ruin since the fall of its roof in 1768. In connection with the abbey sprung up the palace, which became a favorite abode of the Scottish sovereigns. Not, however, till about the era of the murder of James I. at Perth in 1437, did E. become the recognized capital of the kingdom. Neither Perth nor Scone, Stirling nor Dunfermline, being able to offer to royalty security against the designs of the nobles, E. with its castle was thenceforth selected as the only place of safety for the royal household, the parliament, the mint, and the various important government offices. By this means rising in importance, E. became densely peopled, and the houses were built to an unusual height, that the inhabitants might keep within the walls for the sake of protection. The town then consisted of the original main way called the High street, reaching to the Canongate, and a parallel way, narrow and confined, on the s., called the Cowgate, connected with each other by upwards of 100 narrow cross alleys or closes, between dense clusters of houses. Most of these houses consisted of a succession of floors or flats, each being a separate dwelling, and of such floors there were seldom fewer than 6, and sometimes 10 or 12, towering to an immense height, and rendered still more imposing from being built on an eminence.

The citizens remained content with these confined limits till about the middle of the 18th century. Between 1763 and 1769, the North bridge was erected, connecting the old city with the fields on the n., on which the *New Town* was beginning to be built. Shortly afterwards, in 1788, the line of this bridge was extended southwards by 22 arches (the South bridge), only one of which is seen where the structure spans the Cowgate, and thus a level way was opened to the southern suburbs, which have since rivaled the new town in rapid growth. George the Fourth's bridge was erected over the same valley a short distance to the westward, a considerable time afterwards. The Nor' Loch was drained and partially bridged over by the Mound formed from the earth dug from the foundations of the new town, and its situation is occupied by fine public and private gardens which now lie in the center of modern E., and separate Princes street, the southmost and most picturesque street of the new town, from the old town. Two other bridges give access to E.—the Regent's bridge, Waterloo place, which arches the valley between Princes street and the Calton hill to the e.; and at the w. end, the fine Dean bridge over the water of Leith, which is 106 ft. high. Quite recently, a very handsome and commodious bridge has been completed by the railway company, near to and parallel with the North bridge. The new town being built with much regularity in straight streets, and in squares and crescents with numerous gardens, contrasts with the crowded, though picturesque masses of the old town. The dilapidated and dangerous state of part of the old town, and the necessities of sanitary ameliorations in the over-crowded buildings, have occasioned great changes of recent years, and several new streets have been opened up through the most crowded and ruinous localities.

Altogether built of durable sandstone from quarries in the neighborhood, the general aspect of the houses is that of great solidity. Among the most interesting features of the town are the castle, in which are shown the ancient regalia of Scotland; the parliament house, used by the Scottish parliament before the union; St. Giles' cathedral, lately restored, with a magnificent crown on the central tower; the abbey and palace of Holyrood (q.v.); the bank of Scotland, recently rebuilt; the Scott monument, designed by a native self-taught artist; Heriot's (q.v.) and Donaldson's (q.v.) hospitals; the general register house, where all heritable titles and state documents are recorded and preserved; the post-office; the royal institution, where the royal society, and the society of antiquaries of Scotland, meet; national gallery; the university and museum of science and art; the Episcopal churches (St. John's and St. Paul's); and the banks, clubs, insurance offices, and hotels of Princes street and George street. The unfinished national monument on the Calton hill is striking from its position. An Anglican cathedral and a new infirmary have been built. The country round E. is finely varied. From Arthur's seat and Salisbury crags, on the s.e., the eye wanders to the Braid hills on the s., and the richly wooded Corstorphine hill on the w., all within a mile or two of the town; while further off begin the Pentland hills, 4 m. to the s.e.; and to the n. the firth of Forth, and the Fife coast and hills, form a magnificent background. The climate is bracing and healthy, although the situation is exposed, not so much rain falling as on the w. coast, and high winds are very prevalent.

E. is not an important manufacturing town, though it derives considerable commercial importance from its various banks and insurance offices, round which revolves no mean portion of the monetary capital of Scotland. The principal industries are brewing (two thirds of all the ale or beer brewed in Scotland being made in or near E.), printing and publishing with the kindred arts (see BOOK-TRADE), distilling, ironfounding, tanning, and coachbuilding, manufacture of articles in India-rubber, of house-furniture, and of jewelry, and the rearing of young trees in nurseries in and around the town, for which the climate is favorable.

E. is the place of residence of considerable numbers of the Scottish landed gentry, and its society is regarded as unusually polished from the predominance of the professional

and literary elements in its composition. This arises partly from its being a university town, and partly from the presence of the supreme law courts of Scotland (see COLLEGE OF JUSTICE), all the important legal business being attracted thither on that account; the Edinburgh lawyers have charge of most of the landed estates throughout the northern part of the kingdom, so that there is an unusual number of advocates (barristers), writers to the signet, and solicitors (attorneys and conveyancers), and accountants. Its medical practitioners—surgeons and physicians—have a high reputation. E. is much resorted to for the sake of education, for its university (q.v.) and medical schools, its high school, and its various other educational institutes. The Free church and the United Presbyterian church have each a well-equipped divinity hall in E. The opening in 1869 of the merchant company's schools, which (by utilizing certain surplus hospital funds) provide high-class instruction at moderate charges for about 5,000 male and female pupils, has added to the influx of residents desirous of availing themselves of this boon. For the poorer classes, part of the enormous funds of George Heriot's charity have been diverted for cheaper schools throughout the town. Fettes college is a foundation school on the model of Rugby and Eton, and is a handsome edifice.

E. is largely resorted to by visitors to the Highlands of Scotland, and has an unusual number of hotels. There are two theaters, and abundance of amusement, including a large open-air gymnasium. In the southern environs are fine open links or downs, where the game of golf (q.v.) has been played from time immemorial. Excellent street cabs are to be found, and tramways are laid to the suburbs.

E. is the seat of various Scottish boards (poor-law supervision, lunacy, fisheries, school, northern light-houses, etc.); in it the Established and Free churches hold their annual assemblies and courts, as do the United Presbyterians.

E. is a royal burgh, governed by a town-council composed of 41 members. The town-council elects from its own body a lord provost and six bailies, who constitute the civic magistracy. E. is represented by two members in parliament.

In 1821, the pop. was 112,335; in 1861, it was 167,851; and in 1871, 196,979. Number of inhabited houses, 10,529; parliamentary and municipal constituency (1878–79), 28,342.

EDINBURGH, ALFRED ERNEST ALBERT, Duke of, commonly known as prince Alfred; third child and second son of Victoria, queen of Great Britain; b. Aug. 6, 1844. He is also a duke of Saxony, and prince of Saxe-Coburg-Gotha. He was educated by special tutors, and at the age of 14 went into the royal navy, serving chiefly in foreign stations. The crown of Greece was offered to him in 1862, but he declined it. In 1866, he took his place in the house of lords; in 1867, he commanded the frigate *Galatea* on a voyage to Australia and India. He attended a picnic in New South Wales, where an Irishman fired at and slightly wounded him. The duke married at St. Petersburg, Jan. 21, 1874, Marie Alexandrowna, grand duchess of Russia. They have four children, a son and three daughters.

EDINBURGH, THE UNIVERSITY OF, took its rise from a bequest in 1558 by Robert Reid, bishop of Orkney, of 8,000 merks; but the sum was retained for a considerable time by the abbot of Kinloss. The magistrates of the city, on the faith of receiving the bequest, purchased in 1563 a portion of the ground on which the present university stands. Queen Mary was anxious that the proposed institution should succeed, and bestowed upon it grants of confiscated church property. The university was formally founded by king James VI. in 1582 by royal charter, in virtue of which the corporation, up till 1858, remained its patrons or governors. In 1583, the work of instruction began under Robert Rollock, the first regent. Originally, the university consisted of but one class and one regent or teacher. The regent had charge of the students from their enrollment to their laureation at the close of the fourth session of study. As the university prospered, additions were made to the staff of regents, and separate chairs for the several branches were founded. In the beginning of the 17th c., the senatus academicus consisted of a principal and four regents. The first theological chair was instituted in 1642, and the first professor of medicine was appointed in 1685. After 1688, the university of E., along with its sister universities, was subjected to a parliamentary visitation. The commission was issued in 1690, and till the close of the century the university was under its control. Under this supervision, a separate chair of Greek was established; and after 1708, the present arrangement of the faculty of arts came into existence. About this period, the faculty of law was created. During the 18th c., the professoriate rapidly increased; and in 1760, the senatus academicus contained 18 professors besides the principal. Twenty chairs have since been added. In 1858, an act of parliament was passed, by which the constitution of the university was materially changed. The government was taken out of the hands of the lord provost, magistrates, and town-council of the city, and placed in the senatus academicus and a university court; and the patronage of the chairs—from 1582 in possession of the corporation—was transferred to seven curators, three of whom are nominated by the university court, and four by the town-council. A general council was also established, consisting of graduates of the university, and all persons who, up till Aug., 1861, could satisfy the university commissioners that they had given attendance on four complete sessions of the university, two of these sessions being in the course of study

in the faculty of arts. The members of this body, together with the professors and university court, have the right of voting in the election of a member of parliament for the universities of Edinburgh and St. Andrews.

Matriculation, Faculties, Degrees.—Students entering any class in the university, are required to inscribe their names in the general matriculation album of the university, which is the legal record of attendance; and the matriculation ticket serves as a passport to the privileges of the university library. The university consists of the faculties of arts, medicine, theology, and law. The faculty of arts comprises the chairs of humanity, Greek, mathematics, logic and metaphysics, moral philosophy, natural philosophy, rhetoric and belles lettres, universal history, practical astronomy, agriculture, music, Sanscrit, engineering, geology, political economy, fine arts, and education. Attendance on the first seven of these is incumbent on every one proceeding to the degree of M.A. The medical faculty comprises the chairs of institutes of medicine, materia medica, medical jurisprudence, chemistry, surgery, practice of physic, anatomy, pathology, midwifery, clinical medicine, clinical surgery, botany, natural history. The faculty of theology comprises the chairs of divinity, ecclesiastical history, Biblical criticism and antiquities, Hebrew. The faculty of law comprises the chairs of civil law, public law, law of Scotland, conveyancing. The degrees granted by the university are master of arts, bachelor of medicine, master of surgery, doctor of medicine, bachelor of science, doctor of science, bachelor of divinity, doctor of divinity, bachelor of laws, doctor of laws.

Libraries, Museum, Societies.—The university library originated in a bequest, in 1580, by Mr. Clement Little. The bequest amounted to about 300 volumes. It enjoyed the right of receiving every book entered in Stationers' hall, but a composition of £575 per annum in lieu of the privilege was subsequently accepted. The university library contains about 138,000 printed volumes, and 700 volumes of MSS. The university also contains subsidiary libraries, such as the theological library, the humanity class library, etc. The natural history museum was established in 1812, and received a government grant of £200 per annum. It was in 1854 transferred to the new museum of science and art, where it forms a natural history department, of which the professor of natural history is the regius keeper. The anatomical museum was founded by the town-council and the senatus academicus in 1826. The botanical museum is stationed in the botanic garden, which is in connection with the university, and several valuable museums exist as appendages to classes. There are several societies in connection with the university, which meet in its buildings during the winter session.

Bursaries.—There are considerably upwards of 100 bursaries and prizes connected with the university of E., and the total yearly amount of these may be estimated at more than £2,500. These bursaries are appropriated to the different faculties, and are in the patronage of the senatus, the town-council, and of private individuals. Their yearly values range from £5 to £90, and they are generally held for a period of four years.

Scholarships and Fellowships.—There have been recently instituted about 30 scholarships, of the value of from £30 to £120, and 8 fellowships, from £100 to £160 per annum.

Students.—The number of students has of late been steadily increasing, and in 1877-78 reached the large number of 2,500. The present buildings are now found insufficient for so great an attendance, and it is contemplated removing the medical department to new buildings, which are to be erected in the immediate neighborhood of the new royal infirmary.

EDINBURGH REVIEW, the first of the great critical periodicals which form a distinguishing feature of the literature of the 19th century. It was started in Oct., 1802, by a knot of young men living in the northern metropolis, the principal of whom were Francis Jeffrey (q.v.), Sidney Smith (q.v.), F. Horner, and Henry Brougham (q.v.). So much was secrecy felt or believed to be necessary to the success of the undertaking, that, according to the account which lord Jeffrey gave to Mr. Robert Chambers in 1846, "the dark divans" of the reviewers were held for some time "in a dingy room of Willison's printing-office in Craig's Close," to which each repaired alone, and "by back approaches or different lanes." Of the first number, 750 copies were printed: the demand exceeded this limited supply; 750 more were thrown off, and successive editions followed. In 1808, the circulation had risen to about 9,000, and it is believed to have reached its maximum—from which it has declined—in 1813, when 12,000 or 13,000 copies were printed. The pay of contributors was at first ten guineas a sheet, but shortly after "the *minimum*," says Jeffrey, "was raised to sixteen guineas, at which it remained during my reign. Two thirds of the articles were, however, paid much higher, averaging, I should think, from twenty to twenty-five guineas a sheet on the whole number." The original publisher was the well-known Constable. The political views advocated in the early pages of the *Edinburgh Review* were *whig*, and to these it has consistently adhered to the present day. Its influence in developing and strengthening the political convictions of the whig party cannot be overestimated; but its power was even more visible, certainly more immediately palpable, in literature. Amid the feeble and effete periodicals of the day, it burst like a bombshell. The keenness of criticism,

the sharpness of wit, the brilliancy of style, the vigor of mind and comprehensiveness of knowledge exhibited by the writers, excited amazement and fear in the world of letters; and although, in the case of Wordsworth, Southey, and other writers of a certain school, unfairness of a flagrant kind was undoubtedly exhibited and persevered in, yet impartial justice was, on the whole, administered, and the rising generation of authors strained their utmost to escape the lash. Since the period of Jeffrey, the most brilliant contributor to the *Edinburgh Review* was the late lord Macaulay.

EDINBURGHSHIRE, or MID-LO'THIAN, the metropolitan co. of Scotland, lying on the s. side of the firth of Forth. Its greatest length from e. to w. is 36 m., and its breadth 18 m., with an area of 367 sq. miles. From the s. border, the Pentland hills (mean height 1000 ft., and highest point 1839 ft.) and the Moorfoot hills (mean height 800 ft., and highest point 2,136 ft.) run n.e. through the county. In the n. are fertile plains, varied by gentle slopes, ridges, and hills of trap. The coast, 13 m. long, is partly sandy, and is studded with towns, villages, and piers. The chief rivers are not above 20 m. long, and are the Esk, Water of Leith, Almond, and Gala Water. Four great roads and five great railways traverse the county. E. chiefly consists of carboniferous strata, with protrusions of trap. Some lower Silurian rocks occur in the s.e. Coal and iron are chiefly worked in the broad valley of the Esk. Here the bed of coal extends 15 by 8 m., and contains 33 seams ¾ of a foot to 6 ft. thick. The fine sandstone quarries of Craigleith contain large fossil trees, and the limestone of Burdiehouse is famed for fossil fishes. Cold and dry e. winds prevail in spring. Clay soil predominates. The county is chiefly agricultural, with large farms. The harvest is a week earlier on the coast than at the height of 200 ft., and a fortnight earlier than at the height of 600 feet. Near the metropolis are extensive nurseries, vegetable and fruit gardens, and dairy pastures. In 1878, of the total acreage of 234,926 acres, 133,757 acres were in crop. Pop. '71, 328,379. Although not important as a manufacturing county, there are considerable manufactures of various goods in Edinburgh, Leith, and Musselburgh; and there are large paper-mills along the course of the North Esk. Much paraffin oil is made from the rich bituminous shale found within the county. E. returns one member to parliament for the county. It contains 46 parishes. The chief towns are Edinburgh, the metropolis of Scotland; Leith, its seaport; Dalkeith, Musselburgh, and Portobello. In E. have been found cairns, stone circles, Roman coins and utensils, and traces of Roman camps and burying-places. E. was included in the Roman province Valentia, and Cramond is supposed to have been a chief Roman port. It afterwards formed part of the kingdom of Northumbria, 446–1020. The county contains many feudal and ecclesiastical remains, as Borthwick castle, Craigmillar castle, and Roslin chapel.

EDISON, THOMAS ALVA, b. Ohio, 1847, of a mother of Scotch and a father of Dutch descent. The boy had scarcely eight weeks of common school education, but he had a passion for reading, and his education was greatly advanced by the assiduous care of his mother, who, however, died when he was but 15 years old. Before he was 12 he had read Hume and Gibbon, and all that he could get of the *Penny Cyclopædia*. He had a liking for chemistry, and such a thirst for all kinds of knowledge, that he firmly resolved to read every important book in the Detroit public library. With this design he went through Newton's *Principia*, Ure's *Dictionary of Science*, and by way of dessert, Burton's *Anatomy of Melancholy*. Becoming a newsboy on the trains of the Grand Trunk railroad, his employment introduced him to a more varied range of books. The infection of chemistry clung to him, and was developed by his establishing a laboratory in an empty car. But his chemicals exploded, set the car on fire, and put the train in great danger. The boy and his broken apparatus were promptly thrown out of the car by the indignant conductor. The next venture of the young enthusiast was in getting a small lot of type, and issuing on the train a small sheet called *The Grand Trunk Herald*. Becoming acquainted with telegraph operators, he determined to learn the art himself. A kind-hearted station-master consented to give him lessons, and for several months Edison returned to that station after a long day's work, and took his regular lessons at night. He became an expert operator, and was employed at Port Huron, Mich., Stratford, Canada, and Adrian, Mich, where he also prepared a small workshop and began to repair telegraph instruments and manufacture other novel machinery. From this place he went to Indianapolis, where he invented his automatic repeater, an instrument by which messages are transferred from one wire to another without the aid of an operator. He wandered to Cincinnati, Louisville, Memphis, and New Orleans, returned to Cincinnati, and at the age of 20 began to be known as a successful inventor. But he was called to Boston on telegraph business, having become famous as one of the most expert of operators, and there he set up a shop for his experiments. Testing, in 1870, between Rochester, N. Y., and Boston, his new invention of duplex telegraphing, he was not successful; but he was employed by the gold indicator company in New York, of which he became superintendent. While in this position he brought out some new inventions, and introduced improved apparatus. At the same time he set up a factory in Newark, N. J., for making his novel apparatus and machines. Here he employed 300 persons; but the superintendence took so much of his time that he gave it up, and, in 1876, set up a small experimenting establishment at Menlo Park, on the Pennsylvania railroad, 24 m. from New York. This establishment has grown to be

almost a village in itself, and since the commencement of 1879, has been the Mecca of all men interested in the perfection of artificial lighting by electricity. At the time of this writing (Aug., 1880), he has made no public demonstration, but one is promised ere long, and then he confidently expects to give the world a safe, cheap, and reliable electric carbon light that will take the place of nearly all the illuminating materials now in use. The number of inventions, great and small, already patented by Edison, is said to be nearly 200. The most important are the carbon telephone, the phonograph, the micro-tasimeter, the aërophone, the megaphone, the phonometer, the electric pen, and especially the quadruplex system of telegraphing, by means of which four messages at the same time may be sent in opposite directions over a single wire, and perfectly delivered.

EDISTO, a river of South Carolina, flows through the s.w. part of the state, being formed near Branchville of the North Edisto and the South Edisto, and entering the Atlantic by two arms respectively named from the two confluents. E. also designates the island which separates those two arms. The stream is navigable for 100 m. upwards, and its mouth is about 20 m. to the s.w. of Charleston.

EDISTO ISLAND, one of the "sea islands" so famous for long-staple cotton, on the South Carolina coast, between North and South Edisto inlets; pop. '70, 2,762—2,634 colored.

EDMONDS, John Worth, b. N. Y.; 1799–1874; a graduate of Union college, admitted to the bar in 1819, and practiced law in his native city (Hudson). In 1831, he was a member of the state assembly, and of the senate (then the court of errors) from 1832 to 1835. In 1837, he removed to New York city; in 1845, he was appointed one of the circuit judges; in 1847, judge of the supreme court, and in 1852, one of the judges of appeals. About 1851, he became convinced of the truth of spiritual manifestations, and in 1853 publicly declared his faith—preparing and publishing a work entitled *Spiritualism.* He became a leading champion of the doctrines, and his well-known ability as a jurist was of great advantage to the unpopular innovation. He was himself a "medium," and was convinced that he was frequently in communication with the spirits of the departed. No doubt this attachment to spiritualism had great influence in bringing about his retirement from the bench; but no one supposed that his faculties or his honesty as a jurist were in the least influenced by his peculiar belief; nor does any one doubt that he just as honestly believed in the reality of his spiritual impressions as he did in the reality of the civil code or of Blackstone's commentaries. He also published important law reports.

EDMONDSON, a co. in central Kentucky, watered by Green river, crossed by the Louisville and Nashville railroad; 225 sq.m.; pop. '70, 4,459—226 colored. The surface is uneven; soil tolerably fertile; coal is abundant. The chief productions are corn and tobacco. The great attraction of the co. is the famous Mammoth cave. Co. seat, Brownsville.

EDMONSTONE ISLAND, an outpost, as it were, of the delta of the Ganges towards the bay of Bengal, is situated at the mouth of the Hoogly, the most westerly arm of the great river above mentioned. It is the arena of the continuous conflict between the fluvial currents and the oceanic tides. From being merely a sand-bank, it came, not many years ago, to be covered with shrubs, and even to yield a supply of fresh water. After having been adopted, under this new phase, as a marine station, it has since then been abandoned, in consequence of the encroachments of the sea. E. I. is in lat. 21° 32′ n., and long. 88° 20′ east.

EDMONTON, a large village in the n.e. of Middlesex, near the Kerr, 7 m. n.n.e. of London. Pop. of parish '71, 13,860. It contains many villas of London merchants, etc. Charles Lamb is buried in the churchyard here. E. is connected with Cowper's humorous poem of *John Gilpin.*

EDMUND I., or EADMUND I. (Atheling), 922–46; son of Edward the elder, grandson of Alfred the great, and king of the Mercians and West Saxons, succeeded Athelstan (his brother) in 941, at the age of 18. He had shown remarkable bravery three years before in the battle with the Danes at Brunanburg. At the time of his succession the Northumbrians brought over from Ireland Anlaf, a Danish king of Dublin; the Danes joined them, and Edmund was compelled to make a large cession of territory. After the death of Anlaf, Edmund freed his own kingdom, subdued the Britons of Cumberland, and gave their territory to Malcolm of Scotland to secure his co-operation in military service. Edmund was assassinated by an outlaw May 26, 946, while at a banquet.

EDMUND, Saint (Edmund Rich), 1190–1240; b. Abingdon, England; the son of a mother whose piety amounted to ascetic fanaticism, and from whom he learned to become a self-tormentor. He got a tolerable education at Oxford, where he became a teacher in the university. His tendency of mind was to theology, so he became a priest, and was the first Englishman to receive the title of doctor of divinity. In 1227, he was one of the preachers of the sixth crusade. In 1234, he was consecrated archbishop of Canterbury. In 1236, he married king Henry III. to Eleanor, daughter of the count of Provence; but he was soon at enmity with the king, who induced the pope to send to

England a legate who should have authority above that of Edmund. The latter was now in disfavor with both king and pope, and made a journey to Rome to effect a reconciliation; but he was insulted by the pope, and returned to England broken in spirit and resources. In 1240, he went to Pontigny, France, where the queen of France and her sons came to receive his blessing. To find improvement in health, he went to Soissy, where he died. His tomb became immediately famous for miracles, and six years after his death, the man who had always protested against the robbery of the people by the church was proclaimed a saint by the act of canonization.

EDMUND IRONSIDE, king of the Anglo-Saxons, son of Ethelred II., and half-brother of Edward the confessor, was b. in 989. He calls for notice chiefly as the great opponent of Canute and the Danish party. On the death of Ethelred, the Danes proclaimed Canute king of England; but the citizens of London declared for E., who drew together his forces, and engaged Canute, first at Pen, in Dorsetshire (or, as other accounts say, at Gillingham, in Somersetshire), then at Sceorstan, and again at Ottenford, or Otford, in Kent, in all of which battles he was victorious; but a severe defeat which he sustained at Assandun, in Essex, compelled him to compromise with his adversaries. An arrangement was entered into by which England was divided between the two kings, Canute obtaining possession of Mercia and Northumbria, the rest falling to the share of Edmund. It was also agreed that on the death of either, the survivor was to succeed him. E. having died a few weeks after this agreement had been drawn up, Canute became king of all England. E. received the surname of *Ironside,* either from his great strength or from the color of his armor.

EDMUNDS, a co. in central Dakota, formed after the census of 1870. It is in part occupied by the Plateau du Couteau du Missouri.

EDMUNDS, GEORGE F., b. Vt., 1828. Besides a common school education he had the advantage of a private tutor; studied law at an early age, and was admitted to the bar in 1849. He settled in Burlington in 1851, and in 1854, and successively for four years, he was chosen to the popular branch of the state legislature, for three of the five years being speaker of the house. In 1861-62, he served in the senate, where he was speaker *pro tem.* When the rebellion broke out he was a member of the state convention which met to form a coalition between the republicans and the war democrats, and he drew up the resolutions adopted by that convention as the basis of union. At the death of Solomon Foot, Edmunds was appointed to fill the vacancy from Vermont in the U. S. senate, and taking his seat, April, 1866, has been regularly re-elected ever since. In the federal senate he has served on the committees on commerce, public lands, pensions, retrenchment, the judiciary, etc. He was a delegate to the Philadelphia "loyalists'" convention in 1866. He has been for several years at the head of the judiciary committee of the U. S. senate. During the spring of 1880, his name was freely mentioned for the republican presidential nomination.

EDMUND'S (ST.) **HALL,** Oxford, derives its name from St. Edmund, archbishop of Canterbury in the reign of Henry III. As early as 1269, it appears to have been purchased by the canons of Osney, and devoted to purposes of education. On the dissolution of religious houses under Henry VIII., it fell into the hands of two citizens of Oxford, who sold it to William Denyse, provost of Queen's college. The provost devised it to his college, and that society accordingly now nominates the principal of St. Edmund's Hall. There are ten exhibitions attached to the hall, value £30 per annum, appropriated to students designed for holy orders, and in the gift of the principal. In 1875, there were 136 names on the books.

E'DOM (New Testament, IDUMÆ'A), a word signifying "red." It was, according to Gen. xxv. 29-34, the name given to Esau on account of the *red* pottage supplied to him by his brother Jacob. Hence, the country which Esau afterwards obtained was called the land of Edom, but previously Mount Seir. The ruddy hue of the mountain-range, however, may have had something to do with the naming of the region. E. comprised a strip of country 100 m. long by 20 broad, lying between the s. of Palestine and the gulf of Akabah (an arm of the Red sea). It is a wild, mountainous region, with the desert on the e. and w. of it; but rugged though it looks, it contains rich glens and terraces, where flowers, and shrubs, and trees spring up luxuriantly. Its capital was Bozrah (now Buseirah), in the extreme north; its seaports were Elath and Eziongeber, in the extreme south, at the head of the gulf of Akabah. During the reigns of David and Solomon, E. appears to have been under subjection to the Israelites; but when the kingdom of Israel began to decline, the Edomites repeatedly ravaged the southern borders of Palestine, which circumstance is perhaps the reason why they are so terribly denounced by some of the prophets. At a later period, the term Edom (now giving way to the Greek form Idumæa) designated the region between the gulf of Akabah and the Mediterranean, including a part of the s. of Palestine. The revival of Jewish power under the Maccabean princes once more brought Idumæa under Jewish sway. The people were compelled to conform to the laws and customs of their conquerors, and the country was for the future ruled by Jewish prefects, one of whom, called Antipater, who was born in the country, acquired the friendship of the Roman emperor, and was appointed procurator of all Judea. His son was the famous Herod

the great, "king of the Jews." In the 7th c. A.D., E. was overrun by the Arabs, and has ever since shared the fortunes of Arabia.

EDRED, d. 955; king of the Anglo-Saxons, son of Edward the elder, and successor to Edmund I. He was victorious over the invading Danes in Northumbria. His nephew Edwy was his successor.

EDRIOPHTHAL'MATA (Gr., sessile-eyed), a section of the class of crustaceans, consisting of those *malacostracous* crustaceans which have the eyes sessile—not mounted upon stalks. They also differ from the other malacostraca in having the organs of respiration connected with the organs of locomotion; some of them, which constitute the two orders *amphipoda* and *læmodipoda*, having the respiratory organs connected only with the true or thoracic legs, whilst in the remaining order, *isopoda*, they are connected only with the abdominal or false legs. The E. are generally marine; many of the *amphipoda*, however, are inhabitants of fresh water; some of the *isopoda*—as the armadillo-louse and wood-louse—are terrestrial, but are inhabitants of damp places. Many both of the marine and fresh-water species spend their lives rather among the weeds and decaying matters of the shore than in the water, to consume these being apparently their office in the system of nature; some have organs adapted for leaping and for burrowing in the sand, as the common sandhopper (*talitrus locusta*), one of the *amphipoda*, of which countless myriads are to be seen on all our sandy shores, attracting the admiration of even the most careless; some burrow in more solid substances, as the *limnoria terebrans*, one of the marine *isopoda*, which too frequently effects the destruction of piers, dock-gates, etc., perforating them in every direction. Many of the E. are parasitic, some of them on whales, some even on prawns and other crustaceans. Some of the parasitic E. are destitute both of eyes and antennæ.

EDRISI, ABU ABDALLAH MOHAMMAD BNU ABDALLAH BNU EDRIS, AL-HAMUDI, SHERIF, also called AL EDRISI, AL-SIKILI (SICILIAN), or AL-RODJARI (ROGER'S), one of the most eminent Arabic geographers, and a descendant of the royal family of the Edrisites—who traced their origin to Mohammed himself—was b. at Ceuta or Sibta (Civitas) in the year 1099. He studied at Cordova, and early distinguished himself by the extraordinary range and versatility of his talents. He excelled in nearly all the then known branches of science and art; but it was geography which at a very early age seems more than any other science to have attracted him. Having completed his studies, he traveled and visited Constantinople, Asia Minor, Egypt, Morocco, Andalusia, and the coasts of France and England. Roger II., king of Sicily, invited him, on his return, to his court, and lavished upon him all the honors which it was in his power to bestow. A favorite wish of this monarch—one of the most refined and liberal-minded men of his age—had long been to have a representation of the earth, founded on the most recent observations. He accordingly invited travelers from all parts of the world to assist him by sending their itineraries, their measurements of longitudes and latitudes, their observations and adventures—in short, all they had seen or heard on their journeys. The collection of this material occupied 15 years, at the end of which it was handed over to Edrisi. Thus guided, he drew up a map, on a globe of pure silver, weighing 450 Roman pounds (50,400 drachmas), in which the whole of the then known world was represented. He, like Ptolemy, divided it into seven climates, beginning at the equinoctial line and continuing northwards to the limits of extreme cold, and intersected each of these with eleven "regions," represented by perpendicular lines, without any regard to the political or physical features of the respective countries. In explanation of this map, he wrote a book (1153), *Nuzhat al-Moshtak*, etc., in which a full account is given of the towns, mountains, rivers, etc., proceeding from w. to e., according to the order of the climates. Careful as he was in observing and collecting, he could not, in the then state of society and communication, but fall occasionally into serious blunders; but on the whole his statements are peculiarly trustworthy; and being the clearest and most reliable exposition of the state of geographical knowledge in those days, the book remained the great and sole authority down to the time of the Portuguese discoveries. An extract of it was first edited at Rome in 1592, in Arabic, entitled *Nubian Geography*, and reprinted in the monastery of Khesruan, in the Lebanon, with Syriac characters, in 1597—both editions incorrect in the highest degree. The very title was a mistake, the editors having, by a misinterpretation of a passage, been led to believe that E. was a Nubian. Bernardino Baldi translated this extract into Italian in 1600, but his translation was never published. The first published translation was a Latin one, made in Paris (1619) by Gabriel Sionita and Johannes Esronita, a work teeming with the most absurd blunders; and Domenico Macri translaled this Latin translation into Italian. Rosario Gregorio's Latin version of the portion referring to Sicily was published with the text in a collection of Tardia in 1790. Portions of the Arabic text, with comments, have been separately published; the chapters relating to Africa and to Spain by Hartmann (Göttingen, 1796); those concerning Syria by Rosenmüller (1828); and those on Africa and Spain again by Dozy and Goeje (Leyden, 1866.)

The translation of E.'s whole work, in French, was made from two MSS. in the imperial library, by Jaubert, and published (Paris, 1830 and 1840), but it is, unfortunately, not sufficiently faithful. The full text has never been edited.

We shall only add that the incidents of E.'s life have given rise to interminable dis-

cussions. The year and place of his death, as also his creed, whether Mohammedan or Christian, still remain vexed questions. Chief authorities regarding E. are Hadji Kalifah, Schnurrer, De Sacy, Slane, Quatremère, Reinaud, Amari, etc.

EDUCATION is an art, the art, namely, of drawing out (Lat. *educere*) or developing the faculties—of training human beings for the functions for which they are destined. Now, in order to the perfection of an art, it must be founded on a corresponding science; and of nothing is this more true than of education. Before we can hope to mold a human being in a desired way, the nature of that being must be well known. The knowledge of man's nature is usually comprehended under three divisions: the constitution of his body (physiology); the constitution of his mind (psychology); his moral and religious nature (ethics and religion). If we suppose these branches of knowledge thoroughly investigated, they would furnish the solution of the two main points on which all questions of E. turn: first—What are the dispositions and acquirements which it is most desirable to implant and foster? in other words, what is the end or aim that the educator ought to pursue? and second—What are the best means to attain that end? But the sciences above named are themselves in too imperfect and unsettled a state to be the basis of any theoretical plan that would be generally accepted; for our knowledge of living beings, and still more of moral beings, must, as is now well understood, be the last to acquire the shape and certainity of science. See SCIENCE. It is needless, therefore, to look as yet for any complete theory or *philosophy of education*. E. has existed as an art from the very infancy of society, but it is as yet mostly an empirical art, the rules and methods of which have been arrived at by the blind groping of experience—by the process of trial and error. The art of E. is still in the condition in which the art of agriculture was until the present century, when, by the aid of chemistry and vegetable physiology, then arriving at something like perfection, a scientific foundation was laid for it by Liebig and others. Even were the sciences of physiology, psychology, and ethics, on a more satisfactory footing, they would not be immediately serviceable as a foundation for a theory of E., without a preliminary step. This would consist in deducing from them an intermediate science, embodying the *laws of the formation of character*. According to J. S. Mill, it is a body of doctrine of this nature, to which he proposes to give the name of ethology (Gr. *ethos*, habit, custom), that would properly be "the science of which education is the art." But so far is such a science from being yet constructed, that it is only lately that the necessity for it has been pointed out. Notwithstanding this lack of scientific foundation, the practical art of E. has, in recent times, undergone great improvement in almost all its details. It is chiefly in discussions on the subject that the want of fixed scientific principles makes itself felt. A debate on any topic connected with E. usually presents little but a hopeless chaos of conflicting opinions, the most inconsistent arguments being often urged in favor of the same view. What renders the confusion greater, E. is a subject on which every one thinks himself or herself capable of pronouncing an opinion. But this is only another indication of the want of fixed scientific principles. No one presumes to meddle with a question of astronomy or of chemistry unless he has made it the study of a life. In like manner, it is to be hoped that, in proportion as we advance to a philosophy of E., there will be fewer who will take upon themselves to settle off-hand the most difficult questions regarding it.

In the present article, we can do little more than notice the chief divisions into which the subject of E. naturally falls, together with the leading questions that give rise to differences of opinion.

Definition.—It is necessary at the outset to limit the application of the term education. In the widest sense of the word, a man is educated, either for good or evil, by everything that he experiences from his cradle to his grave. But in the more limited and usual sense, the term E. is confined to the efforts made, of set purpose, to train men in a particular way—the efforts of the grown-up part of a community to inform the intellect and mold the character of the young; and more especially to the labors of professional educators, or schoolmasters. It is evident, however, that school E. cannot be understood or practiced rightly except by those who have mastered the idea of E. in its widest sense. It is only the educator who can appreciate the influences which have gone before his own, which are running parallel with them, and will come after them, that is in a position to judge of the course to be pursued.

Moral Training.—The means employed in E. fall naturally under two heads: discipline, or moral training; and instruction, or the imparting of information; although the two often run into each other. Under the head of discipline, come the forming of habits of order, self-control, obedience, civility, love of truth, and reverence for what is good and great. All but the mere outward forms of these is beyond the power of direct teaching; they are imbibed through the silent influence of example. The child instinctively respects and reverences what it sees others respect and reverence; above all, the unselfish affections are called forth only by the breath of affection from without. In this part of the process, it is evident that the school and the professional educator only play a part along with other influences. Nor do they even play the chief part; the home and neighborhood are here the predominent educators.—We cannot here enter into the vexed question of the teaching of religion in schools; it falls under

the head of NATIONAL EDUCATION; as does also the question between voluntary and state schools.

As the process of moral development, through the general surrounding influences, is for the most part unconscious on the part both of those who act and those who are acted upon, it has not yet secured the attention it deserves; in fact, the other branch of the subject, viz., instruction, or intellectual E., being more particularly the business of the schoolmaster, has come in common language to usurp the whole field, so that, by E., we seldom mean more than the imparting of information—instruction.

Instruction.—The business of instruction involves two main considerations—1. What to teach? and 2. How to teach it?

1. Of the vast mass of truths composing the sum of human knowledge, which are to be selected as the *encyclopædia* or curriculum of study for youth? In determining this question, it is to be borne in mind that every truth learned serves two uses—as knowledge to be acted upon, and as mental discipline. In selecting, then, what to teach, we have to consider, not only what is in itself most useful, but also what has the greatest degree of improving effect. On this point, we agree with a recent writer, that "we may be quite sure that the acquirement of those classes of facts which are most useful for regulating the conduct, involves a mental exercise best fitted for strengthening the faculties." If this is true, the prominence given to the teaching of the dead languages of Greece and Rome, in modern E. generally, is more than questionable. It is not disputed that a course of the classics, well taught and well learned, is a good intellectual discipline; but so is any kind of knowledge well taught and well learned, a good intellectual discipline—better than more valuable knowledge imperfectly taught and learned. The question is, whether an equally good culture of the faculties would not be got from a systematic course of equal duration of English and other modern languages, together with logic and moral and physical science. In this case, the subject-matter of the teaching would be an acquisition of great value in after-life to every one, which cannot be said of the other. In the learned professions, no doubt, and for those following literary pursuits, a knowledge of Greek and Latin is of direct use, and will doubtless continue an indispensable element of E.; but perhaps three fourths of those who receive what is called a "liberal" E., and therefore devote the strength of six or seven years to Greek and Latin, never open a book in these languages from the time they leave school. We are not prepared to maintain that the same effects in the way of discipline have as yet been actually produced, on any great scale at least, by the teaching of science and of modern languages, as result from the drill of the classical schools; but we believe that this arises from the fact that no such course of instruction has hitherto been pursued with the same system and perseverance which characterize classical schools.

In respect of direct utility, the things most necessary to know, are those that bear most directly—

1. On the preservation of life and health, and the proper performance of the more common industrial labors. This involves a knowledge of our own bodies and of the bodies of which the universe is made up; in other words, more or less of the knowledge which, when put into systematic forms, is known as the sciences of physiology, natural philosophy, and the other physical sciences.

2. A knowledge of our moral relations. Besides a knowledge of the ordinary moral duties, and the high religious sanctions with which they are enforced, this implies some acquaintance with the laws of economy.

3. As a preliminary step, and as the medium through which all other knowledge is conveyed, there is required a knowledge of the mother-tongue, and the faculty of reading and writing it. Allied to language is a knowledge of counting and measuring, and the naming and classifying of the objects of which the world is composed (natural history), together with a knowledge of the countries and places on the earth's surface (geography).

4. The cultivation of the taste and the imagination, or the faculties which derive pleasure from music, painting, sculpture, architecture, poetry, and works of fiction.

Under the head SCIENCE will be given a complete tabular view of the various branches of human knowledge or sciences, together with the corresponding arts or applications. It will there be shown that there is a natural order of dependency among the fundamental sciences, which determines the order in which the different kinds of facts should be taken up in learning. (An admirable mapping out of the whole field of knowledge in relation to E., is given by Dr. Neil Arnott in his *Survey of Human Progress* (Lond. 1861).

The different offices and employments characteristic of an advanced state of society, require a corresponding difference in the amount of knowledge and skill possessed by those who are to fill them—a difference which is vaguely and inadequately expressed in the usual division of schools into primary schools, middle or higher schools, and universities.

A course of primary instruction embraces only what is considered absolutely indispensable. Not that there is a limit to the degree of intelligence that is desirable in any class of the community; but for those who must, from early years, spend most of their time in manual labor, i.e., for the vast majority of the race, there is a very short limit

to the degree possible. The grand question here would be to determine the order of desirableness of the different subjects to be taught, so that, beginning with the most indispensable, more and more might be added as circumstances would permit. Until recently, reading, writing, and arithmetic were considered the beginning and end of a course of primary instruction. These, however, are not so much knowledge themselves as instruments for acquiring knowledge; and therefore the primary teacher in the present day considers it his duty to give, in addition, as much information of a directly useful kind as possible. But in avoiding one error, he not unfrequently falls into the opposite; for, after all, the three branches above named are the first and most indispensable steps in instruction. Those who can read and write may acquire information after leaving school. Reading and writing, unless learned at school, are, as a rule, never learned; and thus the grand access to knowledge remains for ever shut. Nor is it enough to have made a beginning in the arts of reading, writing, and counting; unless such a degree of facility is acquired before leaving school as to render the exercise a pleasure, it is not kept up in after-life, and the little that was learned is soon forgotten. We believe that in all schools, but especially where the children are liable to be early withdrawn, everything else ought to be held secondary until the painful stage in learning to read, write, and count, is fairly got over. With regard to the positive knowledge hitherto got in primary schools, there is a general feeling that few teachers succeed in giving it a direct bearing on the actual concerns of life. Hence the aversion expressed in many quarters to the introduction of the "ologies" into common schools, and the rather vague demand for the teaching of "common things."

Middle or secondary schools either serve for those who have leisure for a higher degree of culture than the elementary course above described, or they serve as nurseries for the highest kind of educational institutions, viz., the universities. Under the head of secondary schools may be ranged the institutions that go by the names of high schools, academies, grammar-schools (the *gymnasiums* of Germany, and the *colleges* of France). In these, the course of instruction usually embraces other languages besides the mother-tongue, and more or less of the elements of the various sciences. The titles of a series of text-books, such as those composing Chambers' *Educational Course*, give a notion of the great variety of subjects that are considered requisite in middle-class education. Much yet remains to be done to chalk out a judicious course of middle-class instruction —sufficiently wide to be a foundation for after-acquisitions, and yet not so multifarious and detailed as to be impossible to overtake except as ill-digested cram.—Where preparation for the university is the object, Greek and Latin are the chief subjects of attention.

The highest degree of culture is represented by the universities (q.v.).

Special or Technical Education.—Up to a certain point, the education of all young persons is, or ought to be, substantially the same; for the end in all cases is to train them up to be intelligent, virtuous, and active men and women, capable of turning their talents to account in whatever situation they may be placed. But in all civilized societies, the duties and employments are so diverse, that the members must begin betimes to receive special training, according to their future destination. This special training is either of an intellectual or a mechanical kind, or it may partake of both. This branching off of education into special tracks is conspicuous in the higher education given in universities, where from the very first there have been—besides the faculty, as it is called, of philosophy, including a number of branches of a general nature—special departments or faculties of law, medicine, and theology. But besides these "professions," as they are styled, a number of branches of industry have in recent times, by the application of scientific processes, and from other causes, risen into a condition which requires, at least for those who are to direct them, a special range of instruction and information; such are engineering, mining, chemistry applied to the arts (technology), for which special schools are now established in most centers of industry. There are two "specialties" which, from the immense numbers engaged in them, assume unwonted importance—namely, agriculture (see AGRICULTURAL SCHOOLS) and commerce. So prominent a place does commerce hold in this country, that any school which is above an elementary school, and at the same time not a classical school, usually gets the name of commercial. The chief points in a special education for the mercantile life are usually held to be, facility in writing and calculating, and a knowledge of book-keeping. What would seem to be the most essential part of a mercantile education, is usually neglected —the principles, namely, of political economy—the science of wealth.

Industrial Education.—The acquiring of mechanical skill for a particular handicraft or occupation—in other words, apprenticeship—is, properly speaking, a part of education; but as it is not usually begun until the school education is considered finished, it hardly falls within our province. Yet the abrupt separation of these two stages is attended with evils that are beginning to make themselves felt. For, first, the poorer classes, either from necessity or cupidity, are induced to withdraw their children from school as soon as the provisions of the acts dealing with education will permit them, so that they may as early as possible turn the capabilities of their children to practical account. When to this is added the irregular attendance even during the few years that they are nominally at school—and this is a difficulty which even the recent elementary education acts have not been able wholly to subdue—the result is, that this class remain to a great extent uneducated; comparatively few have got over the initial mechan-

ical difficulties of reading and writing, so as to keep up the habit in after-life, and thus they soon lose the little acquirements they had made.

On the other hand, to continue the intellectual and moral E. of youth up to the age of 14 or 16, as is the common practice among the middle classes, and among the well-to-do of the artisan class, and then abruptly to break this off, and begin at once an industrial occupation on the full time of an adult who has been used to the work, is, on the face of it, an irrational way of proceeding. The power of applying steadily, day after day, to one occupation, is the hardest lesson for man to learn; it is that which, more perhaps than anything else, distinguishes civilized man from savage and semi-barbarous man; and as the boy is "the barbarian of the civilized community," this aversion to steady industry is yet strong in him. It is surely wise, then, to break him into it gradually; to begin, while yet his school E. is going on, by short exercises of his industrial faculties at first, and gradually increase the daily hours of work as his physical strength and powers of will become hardened. We believe that many a youth who, on the usual system, breaks down at the very commencement of his industrial career, runs away from his apprenticeship, and becomes unsteady, idle, perhaps a *scamp*, for life, might, by a gradual initiation, have become an industrious man and good member of society. So far, again, would this plan be from infringing upon the usual E. given at school, that it is only in some such way that, in a country like ours, the school E. of those who have to earn their own bread can be prolonged to the age necessary for learning much that every member of the community should know.

Theoretically, we believe it to be indisputable, that school E. and industrial training ought, for some time at least, to be conjoined. How to make them dove-tail into one another in practice, is one of the chief educational problems of the day. One step towards it has been made in the *half-time system* enforced by act of parliament with regard to children employed in factories. Children may be employed as early as the age of 10 years, but all between the ages of 10 and 13 (or 14 if the child have not a certificate of educational proficiency) are limited to half-time daily either forenoon or afternoon, or to whole-time every alternate day; nor can they be employed even in these ways but on condition of receiving three hours' schooling daily, or the usual school hours every alternate day. Experience has established the fact, that in proportion to the hours spent in school, these "half-timers" make more rapid progress than the whole-day scholars; at the same time, whether they are destined to be factory-workers for life or not, they are acquiring habits of industry and manual dexterity which are of essential use in any future employment.

Industrial training is now conjoined, to a greater or less extent, with school-teaching in almost all institutions for the E. of pauper children—parochial union schools, ragged schools, as well as in professedly industrial schools. See INDUSTRIAL SCHOOLS, RAGGED SCHOOLS, REFORMATORIES. The chief difficulty in this movement is to find fitting work. And here it may be observed, that the object is not to teach particular trades with a view to the boys following these in after-life; this, though it were desirable, would obviously be impracticable as a general system. The object is, to promote the health, to develop the muscles, and to induce habits of steady and patient endurance of work.

The industrial training of girls is of yet more urgent necessity than that of boys. The ordinary domestic operations involved in household management ought naturally to be learned at home under the guidance and example of the mother; and the object at school, in a right and normal state of things, would be to initiate the girls in things, in the way of improvements, that their several homes might not exhibit—to insure progress, in short. But unhappily, in the homes of the great mass of the operative population of these islands, the mother is at present quite unfit for this primary duty. The extension of the factory system of work, instead of the domestic, has revolutionized the domestic life of a great part of the operative population, and with our *laissez-faire* policy in E., we have allowed a generation to spring up, in which a great part of the married women have lost whatever traditional housewifery their mothers might have had, and can neither cook, wash, nor sew. The consequence is, that the food of the household is unsavory, indigestible, innutritious, and at the same time unthrifty; while the whole *ménage* has that character of untidiness and discomfort that often drives the husband to the pot-house. For girls of this class, there is needed a training in some public institution in the very elements of housewifery; while, for all classes, there is great need for instruction in a better style of cookery than that generally prevalent. The public mind has at last become awake to this necessity, and domestic economy has been made an essential element in primary schools for girls in Great Britain. See DOMESTIC MANAGEMENT.

2. "How to teach it."—It is a great error to suppose, that because a man knows a thing, he can therefore teach it. Teaching is one of the most difficult arts, and requires natural aptitude and acquired skill. The necessity of special study and practical training or apprenticeship to make a schoolmaster, is a discovery of recent date, and has given rise to teachers' seminaries or normal schools (q.v.), where they receive special instruction in the most approved methods of teaching, and practice in their application. It is to the greater acquaintance with right methods, on the part of schoolmasters, that we are to look for the solution of one of the greatest difficulties—how, namely, to over-

take all the work that is necessary to be done in the school-period of life, without keeping the learners too many hours a day at their tasks. As things are usually managed, very little of the time devoted to lessons is spent in actually learning anything whatever; as any one may satisfy himself by calling to mind how his own time was spent while seated on the school-benches. There is here a rich mine waiting to be worked—the gold-fields of future generations. It is not to be disputed, that three hours of hearty, spirited exertion will do more, in the way of learning, than is accomplished in six hours in most schools. The three hours thus set free would be clear gain; for time spent in trifling or in heartless fagging is utterly lost. The child is all the while plagued without being profited, and would be better employed in being happy in his own way. This matter of the happiness of the young has not yet received the attention it deserves in schemes of education. As Sidney Smith has well expressed it, "if you make them happy now, you make them happy twenty years hence, by the memory of it;" so that while looking after the formation of other valuable habits, the educator must not overlook the habit of happiness.

Increased economy of time in teaching, besides setting free sufficient time for play, would admit the more general introduction into school education of military drill (including gymnastics). This, in addition to its immediate purpose (see VOLUNTEERS), would be a most valuable aid in moral education, by promoting habits of prompt obedience, order, and politeness. On this subject, see *Communications from Edwin Chadwick, Esq., respecting Half-time and Military and Naval Drill*, made to the education commission, and printed among parliamentary papers, 1861.

For further information on the subject of this article, see, in addition to the references already given, the heads INFANT SCHOOLS, EVENING SCHOOLS, MONITORIAL SYSTEM, PESTALOZZI, HAMILTONIAN SYSTEM, NATIONAL EDUCATION.

EDUCATION, COMMISSIONER OF, the chief officer of the bureau of education, at Washington. He is appointed by the president and senate, and his duties are "to collect such statistics and facts as shall show the condition and progress of education in the several states and territories;" to diffuse such "information respecting the organization and management of schools and school systems and methods of teaching as shall aid the people in the maintenance of efficient school systems, and otherwise promote the cause of education;" and also "to present annually to congress a report embodying the result of his investigations and labors, together with a statement of such facts and recommendations as will, in his judgment, subserve the purpose for which the department is established."

EDUCATION, MILITARY, is now superintended, so far as concerns regimental schools, by a particular department of the war office. In this sense, it does not really mean military education, but schooling of a humble kind supplied to soldiers and their children. In its proper sense, the term relates to the professional training of those destined to be officers in the army. This is not to so great a degree under government control in England as in continental countries. See ARTILLERY, SCHOOLS OF; CADETS' COLLEGE; CROYDON (Addiscombe); DUKE OF YORK'S SCHOOL; MILITARY SCHOOLS; REGIMENTAL SCHOOLS; SANDHURST; STAFF COLLEGE.

E'DUCT is a term employed in chemistry to indicate that the body to which it is applied is separated by the decomposition of another in which it previously existed as such. It thus stands in opposition to *product*, which denotes a compound not previously existing, but formed during decomposition. Thus, the volatile oils which pre-exist in cells in the fruit and other parts of plants, and oil of sweet almonds obtained by pressure, are educts; while oil of bitter almonds, which does not pre-exist in the almond, but is formed by the action of emulsion and water on amygdalin, is a product.

EDUR', a rajput state of Guzerat, is tributary to the guicowar, being, in common with his immediate dominions, subject to the political superintendence of the presidency of Bombay. With a revenue of nearly £25,000, it maintains a force of about 1000 men. Its capital, of the same name, contains about 10,000 inhabitants; and the pop. of the state was in 1872 estimated at nearly 220,000.

EDWARD, or EADWARD, I. (THE ELDER), d. 925; king of the Anglo-Saxons, eldest son of Alfred, succeeded his father in Oct., 901, when about 30 years of age, having previously distinguished himself by defeating the Danes. His cousin Ethelwald, who disputed Edward's right of succession, and endeavored to obtain the throne, was killed in battle. The reign of Edward was turbulent, but at length he thoroughly subdued the Danes, those of Northumbria, as well as the Scots, and the Welsh accepting him as their "father and lord." He carried the Anglo-Saxon rule to a power before unknown.

EDWARD, or EADWARD, II. (THE MARTYR), d. 978; king of the Anglo-Saxons, succeeded his father Edgar in 975 A.D., at the age of 13. His succession was contested in behalf of his younger brother, only 7 years old; but the powerful influence of St. Dunstan secured Edward's triumph. He died by treachery. Returning exhausted from the chase he was lured to the residence of Elfrida (the mother of the contesting prince) and there stabbed in the back.

EDWARD THE CONFESSOR, king of the Anglo-Saxons, was b. at Islip, in Oxfordshire, about the year 1004. On the death of his father, Ethelred, in 1016, Canute the

Dane obtained possession of the throne, and in the following year married Emma, the mother of Edward, by whom he had two sons, Harold and Hardicanute. Until the death of Canute in 1035, E. lived in Normandy; he then made an ineffectual attempt to establish his authority in England; but his mother Emma had now transferred her affections to her younger children; and she exerted all her influence and energy in favor of Hardicanute, who, on the death of his brother Harold in 1040, became sole ruler of the Anglo-Saxon kingdom. Hardicanute, however, was generous enough to invite his half-brother to England, whither accordingly E. went, and was honorably received. On the death of Hardicanute in 1042, E. was declared king. The person chiefly instrumental in bringing about this result was earl Godwin, whose only daughter, Editha, was married to the king in 1044. The lady only became his queen, not the partner of his bed. For this revolting asceticism, the honor (if it be such) of canonization, and the title of confessor, was conferred on him, about 100 years after his death, by pope Alexander III. Scrupulous as E. was in regard to one of the passions, he had no repugnance to gratify another of a far less justifiable kind. His first act after his accession, was to deprive his mother of all her treasures—lifting even the cattle and corn from her fields, and, according to some accounts, endeavoring to compass her death. The whole of E.'s reign is simply the record of the growth and struggles of the Norman or court party with the national or Anglo-Saxon party; for an account of which see articles Godwin and Harold. E.'s wars with the Welsh in 1057 and 1063, and with the Northumbrians in 1065, were short and successful. He died 5th Jan., 1066, and was succeeded by Harold, son of earl Godwin. The prosperity which England enjoyed during the reign of E. was owing to its not being exposed to the wasteful calamities of foreign invasion, while its free intercourse with France, or at least with Normandy, greatly civilized and refined the somewhat Bœotian habits and manners of its inhabitants.

EDWARD, the Black Prince (Edward III. *ante*), 1330–76; son of Edward III. of England, and Philippa. He was created duke of Cornwall in his eighth year, and a year later, during his father's absence in France, was appointed nominal guardian of the kingdom. He held this office also in 1340 and 1342; and was created prince of Wales on the king's return in 1343. Three years later he accompanied his father to France, and in the battle of Crécy led the most victorious division of the army. He also shared his father's glory in the victory over the Spanish fleet at the battle of L'Espagnols-sur-Mer. In 1355, he was given command of the chief army in the French war, landed at Bordeaux, and after several smaller successes, in 1356 he gained the victory of Poictiers, capturing the French king, whom he carried captive to London in 1357. In 1361, during the short peace following king John's ransom, he married his cousin Joanna, the "fair maid of Kent," of whom he was the third husband, and being created duke of Aquitaine, crossed over to his new dukedom, where he ruled successfully and peacefully for a time. Making an entangling alliance with Pedro, the deposed king of Castile and Leon, although victorious he found himself burdened with the expenses and losses of a profitless war, and for the excessive taxes laid upon his duchy he was summoned to account at Paris. To this summons he replied haughtily that he would come "helm on head, and with 60,000 men." This led to a rupture between France and England. The French planned a double invasion of English territory. The duke of Anjou, commanding one expedition, besieged Limoges, which had been ceded to the English by the treaty of Bretigny and formed part of the principality of Aquitaine. The city surrendered by the treachery of its bishop. The black prince, enraged by this act, after a siege of a month, recaptured the city by assault, and put to the sword 3,000 of its inhabitants. This madness of cruelty is the chief blot on the fame of the prince. It is only partially explained by his disordered health, which itself was perhaps due to the irritation of seeing the English power waning in France, in spite of all his victories. He was compelled, by the advice of his physicians, to return to England the following year, 1371, where he lingered in continually failing health for five years. In these years he saw the loss of Aquitaine to England, but he did good service to the country in opposing the corrupt and oppressive influences which surrounded the king, and by his help parliament was able to pass acts against the king's mistress, Alice Ferrers, and in restraint of the dangerous ambition of John duke of Lancaster. These patriotic services endeared him to the people, and before his death he had regained the popularity of his earlier years. His mailed effigy marks the place of his burial in Canterbury cathedral.

EDWARD I., King of England, was the eldest son of Henry III. by his wife Eleanor, daughter of Raymond, count of Provence, and was b. at Westminster, June 16, 1239. That union of valor and intelligence which characterized him was exhibited at an early period. At the commencement of the struggle between Henry and his barons, prince E., who was then governor of the duchy of Guienne, came over to England, and boldly declared his dissatisfaction with his father's conduct. Subsequently, he took the king's side in the war, and by his vigorous generalship put an end to the insurrection in a few years, but there is no evidence to show that he had changed his opinion of Henry's policy; and it is remarkable that he himself, during the whole of his reign, carefully avoided coming into collision with his nobles. When the last of the crusades was organized, at the instigation of pope Gregory X., prince E. arranged with Louis, king France, to take part in it. Louis died before reaching Palestine, but the former landed

at Acre in 1271. Nothing, however, of any consequence was achieved; and in the following year he set out on his return to England. At Messina, he heard of his father's death, whereupon he proceeded to France, and did homage to Philippe III. for his French possessions, arriving in England 25th July, 1274. He and his queen, Eleanor, were crowned at Westminster on the 19th of Aug. following. His first military expedition, after his accession to the throne, was directed against the Welsh. After a contest of nearly 10 years—in the course of which the famous prince Llewellyn was slain at Llanfair, 11th Dec., 1282—Wales was finally subdued and incorporated with England. His next ambition was to possess himself of Scotland. The death, in 1290, of Margaret, granddaughter of Alexander III., and known as the maiden of Norway, who was to have been married to E.'s son, seemed to have frustrated his design; but the selfishness of the 10 competitors for the Scottish crown who now appeared, induced them to acknowledge E. as *Lord Paramount* of Scotland, each hoping that he would thereby secure the English monarch's support. The competitors were also foolish enough to make him umpire among them, or perhaps it would be more correct to say, they were not powerful enough to refuse his arbitration. Be that as it may, E. decided in favor of John Baliol at Berwick, 17th Nov., 1292; and Baliol immediately took the oath of fealty to him; and on the 26th of Dec. did homage to the English king for his crown at Newcastle. The patriotism and pride of the Scottish nation took fire at such humiliation, and in a short time Baliol was hurried by his subjects into a war with England. In 1296, E. entered Scotland, devastating it with fire and sword. He penetrated as far n. as Elgin, compelled Baliol to resign the kingdom, and governed the country by means of his own officers. It was during this expedition that he carried off from the cathedral of Scone the celebrated stone on which the kings of Scotland used to be crowned, and which is now in Westminster abbey. A second rising took place in Scotland in the following summer. The leader on this occasion was William Wallace (q.v.), whom tradition represents as the most heroic and unselfish of patriots. He was completely successful for a time, chiefly it is to be supposed on account of the absence of Edward. In the spring of 1298, however, that sovereign again made his appearance in Scotland, and gave battle to Wallace at Falkirk, on the 22d of July. Partly through treachery, and partly, no doubt, through the superior generalship of E., who is considered to have been the first military commander of his time in Europe, the Scottish forces were entirely defeated. The next five years were spent by the English king in reducing the country to obedience—with very imperfect success, however. In the summer of 1303, he led a third large army into Scotland, and once more spread havoc and ruin to the shores of the Moray firth. The last castle that held out against him was Stirling, which did not yield till the 20th of July, 1304. E. wintered at Dunfermline. Some time after this, Wallace either fell into his hands, or was betrayed, and on the 23d Aug., 1305, was hanged, drawn, and quartered as a traitor, at Smithfield, in London. E. now probably thought that he had no further danger to dread from Scotland, but if so, he was quickly undeceived. Robert Bruce, earl of Carrick, grandson of the chief rival of Baliol, suddenly left the English court, where he had been residing, in the beginning of 1306, unfurled once more the banner of Scottish independence, and on the 27th Mar. of that year was crowned at Scone. An English army, under the earl of Pembroke, was immediately despatched to Scotland; and at the close of the year, the king himself set out to chastise Bruce. But worn with the "sturt and strife" of many years, the cares of his own kingdom, and the anxieties of conquest, E. only lived to reach Burgh-on-Sands, a village beyond Carlisle, where he expired, 6th July, 1307, "in sight of that country," says lord Hailes, "which he had devoted to destruction."

E. possessed most of the qualities that go to form a great ruler: valor, prudence, inexhaustible energy, and pertinacity are visible in his whole career. He was ambitious, it is true, but in his age, ambition was looked upon as a virtue rather than as a crime; it was the natural accompaniment of kingly courage. His relations to Scotland were also unfortunate. Few people of any understanding, however, now doubt that the best thing possible for that country would have been a peaceful union with England, for at that time there was no hatred or jealousy between the two nations. The death of the maiden of Norway destroyed every chance of such a union, and the great mistake committed by E. was his endeavoring to bring about by force what could prove beneficial only when it was the result of voluntary agreement. The effect of his mad endeavor was to plant in the breasts of the two nations the *germs* of a hitherto unknown hostility, which, in subsequent generations, worked incalculable mischief, and the traces of which have not wholly disappeared even at the present day. As a civil ruler, E. is entitled to the highest praise. Immense progress was made during his reign in the establishment and improvement of law and order throughout the land, the reformation of civil abuses, and the restriction of ecclesiastical jurisdiction and encroachments. He has been called the English Justinian; and both Hale and Blackstone affirm, that "the very scheme and model of the administration of common justice between man and man was entirely settled by this king." Ireland and Wales participated in the benefits of English law. It was during E.'s reign, too, that the representation of the commons of England first became regular; but probably the greatest advantage obtained by the nation, was the declaration that the right or privilege of levying taxes resided in the parliament. In general, it may be said that E. ruled in

harmony with the ideas and desires of the best heads among his nobles and burgesses; and though touchy on the question of his prerogative, like every Plantagenet, and very cruel in his treatment of the Jews, he must be regarded, on the whole, as one of the most enlightened, liberal, and sagacious monarchs of his age.

EDWARD II., son of the preceding, was b. at Caernarvon, in Wales, 25th April, 1284, and in 1301, was created prince of Wales, being the first heir-apparent of the English throne who bore that title. He accompanied his father on his various expeditions into Scotland, and on the death of the latter at Burgh-on-Sands, he led the English army as far n. as Cumnock, in Ayrshire, after which he returned to his own country. At home, E.'s conduct was contemptible. While still a youth, he had conceived an extraordinary admiration and fondness for a witty, clever, but dissolute creature called Piers Gaveston, the son of a Gascon knight. After he became king, there was no limit to the honors heaped on the favorite. When he went to France, in the beginning of 1308, to conclude a marriage with Isabella, daughter of Philippe V., king of France, Gaveston was left guardian of the kingdom. The nobles were indignant, and demanded his banishment. Twice was Gaveston forced to leave England, but as often was he recalled by the weak monarch, whose love for him was sheer infatuation. At last the nobles rose in arms, besieged Gaveston in Scarborough castle, and having forced him to surrender, hanged him at Warwick, 19th June, 1312. Two years after this, E. invaded Scotland at the head of the greatest army ever collected in England—amounting, according to some historians, to 100,000 men. At Bannockburn, on the 24th June, 1314, he was encountered by Robert Bruce (q.v.), and defeated with immense slaughter. This victory put Scotland and England on equal terms for all time coming, and made the notion of a military subjugation of the former country by the latter be given up. Finally, in 1319, after numerous petty successes on the part of the Scotch, E. concluded a truce with them for two years. He now exhibited again his imbecile passion for favorites. The person selected on this occasion was Hugh le Despencer. Once more the nobles rebelled, and both Hugh le Despencer and his father were banished in July, 1321, but some months after, were recalled by E., and many of the nobles, among others, the earl of Lancaster, were beheaded in the following year. Immediately after, E. invaded Scotland for the last time, and penetrated as far as Culross, in Fife; but having achieved no particular success, he concluded a truce with that nation for thirteen years, and returned to England. A dispute now arose between him and Charles IV. of France, brother of his wife Isabella, in regard to the territories which he held in that country. Charles seized them, whereupon E. sent over Isabella to remonstrate, and, if possible, to effect an amicable arrangement between them. Isabella, it would appear, despised her husband, and disliked the Despencers. Meeting at the French court many English nobles who, entertaining similar feelings, had left their country to avoid the enmity of the favorites, she was easily induced to make common cause with them against her husband and the Despencers. At the same time, she formed a connection of a criminal kind with Roger de Mortimer, one of the most powerful of the exiles. This of course more thoroughly involved her in the plot against Edward; and having obtained possession of the young prince of Wales, afterwards Edward III., she embarked from Dort, in Holland, with a large body of malcontents, and landed at Orwell in Suffolk, 22d Sept., 1326. The queen and the banished nobles were soon joined by all the influential persons in England. E. fled, but was taken prisoner at Neath abbey, in Glamorganshire; the Despencers, father and son, were executed; and the monarch himself, after being formally deposed, 25th Jan., 1327, was murdered in Berkeley castle, 20th Sept. of the same year. He left two sons and two daughters.

EDWARD III., son of the preceding, was b. at Windsor, 13th Nov., 1312, and ascended the throne, 25th Jan., 1327. During his minority, the country was governed nominally by a council of twelve nobles and bishops, but really by Mortimer and his paramour Isabella. On the 24th Jan., 1328, the young king married Philippa, daughter of the earl of Hainault; and two years after, resolving to take the power into his own hands, he seized Mortimer, and put him to death, 29th Nov., 1330, and banished his mother, Isabella, to her house at Risings (where she lived for twenty-seven years). He next invaded Scotland, to assist Edward Baliol, son of John Baliol, who, in the confusion that ensued on the death of the great Bruce, had made a descent on the country, and got himself crowned at Scone. A bloody battle was fought at Halidon hill, near Berwick, 19th July, 1333, in which the Scots were completely defeated. Baliol now assumed the authority of a king, and did homage to E. for his possessions, the result of which act was, that he had to flee the kingdom in a few months, for the thing most intolerable to the Scottish spirit was that any monarch should dare, or fancy he had a right, to surrender the independence of his country. In the course of three years, E. thrice invaded Scotland; but though he frightfully wasted the country, and brought armies with him such as could not be successfully opposed, he could not break the invincible spirit of the people, who, after each invasion had rolled over them like a flood, rose and rallied with a still more stubborn and impassioned resolution to be free. But the scene of E.'s great exploits was France. Charles IV. having died without a son, Philippe of Valois, the nearest heir by the male line, ascended the throne, under the title of Philippe VI. E. claimed the

crown in right of his mother Isabella, sister of Charles; but as the law of France expressly excluded females from enjoying sovereign rights, it is manifest that E.'s claim was utterly groundless. The English king admitted that his mother, being a female, could not inherit the crown of France, but affirmed that he, as her *son*, might. But it is clear that he could not receive from his mother rights to which she herself had no claim. Yet never was a bad cause ennobled with more splendid triumphs. E. declared war against Philippe in 1337. His first campaign was not very remarkable; but in 1346, accompanied by his eldest son, known as the black prince, he again invaded France, conquered a great part of Normandy, marched to the very gates of Paris, and on the 26th Aug., 1346, inflicted a tremendous defeat on the French at Crécy (q.v.). Here the black prince, though only sixteen, exhibited the courage and the prowess of a veteran, slaying with his own hand the king of Bohemia, who fought on the side of France. After some further successes, such as the reduction of Calais, a truce was concluded between the two nations for several years. Meanwhile, the Scots had sustained a severe defeat at Neville's Cross, near Durham, their king (David) being taken prisoner. In 1356, the war with France was renewed, and on the 19th Sept. of that year, the black prince obtained a brilliant victory at Poitiers, king John of France (Philippe having been dead for some years) falling into his hands. The Scotch monarch was released for a ransom of £100,000 in 1357, and king John in 1360, when a peace was concluded between the French and the English, by which the latter were to retain their conquests. King John, however, finding it not consistent with the honor or desire of his country that such a peace should be carried out, magnanimously returned to captivity, and died in London, 8th April, 1364. Shortly before this date, David, king of Scotland, whose residence in England had extinguished the little patriotism he ever had, entered into a secret agreement with E., in virtue of which his kingdom—if he died without male issue—was to be handed over to the English sovereign. Meanwhile, the black prince, who had married Joanna, daughter of the earl of Kent, had received from his father Aquitaine and Gascony, and ruled there for some time very prosperously; but ultimately involving himself and his father in a war with France, which was disastrous in its issues, he was obliged, in 1374, to conclude a truce for three years. E. waged war no more. In spite of his brilliant victories, in spite of the dazzling valor of his son, he was at the last unsuccessful. Neither in Scotland nor in France did he realize his desires. Affairs at home were no less unsatisfactory in the last years of his life. He quarreled with his parliaments, and the black prince led the opposition. The latter, however, died 8th June, 1376, in the 46th year of his age. E. himself expired on the 21st June, 1377, after a reign of 51 years. By his wife, Philippa, he had seven sons and five daughters, several of whom died young. He was succeeded by his grandson Richard, son of the black prince, who ascended the throne as Richard II.—The reign of E. was marked by the great progress made in law—a greater number of "important new laws being passed than in all the preceding reigns since the conquest." Among these laws were several indicating the increasing repugnance of Englishmen to ecclesiastical, and especially to papal jurisdiction. Trial by jury also now began to supersede other modes of trial. Justices of peace likewise make their earliest appearance in this reign, and legal proceedings were ordered to be carried on henceforth in English, and not in French. Sir James Mackintosh is of opinion, that though E.'s "victories left few lasting acquisitions, yet they surrounded the name of his country with a luster which produced strength and safety"—an opinion which appears, on the whole, to be well founded. It remains to be said that E.'s reign witnessed the culmination of chivalry, and in the black prince, possessed a splendid example of its virtues and its vices. The fine arts, especially architecture and poetry, also attained a grand development. Chaucer, Gower, and several eminent chroniclers, flourished at this time, and in the sphere of religious reform stands out the noble and thoroughly English figure of Wickliffe.

EDWARD IV., son of Richard duke of York, and great-grandson of Edmund duke of York, who was the 5th son of Edward III., was b. at Rouen, 29th April, 1441 (or, according to another account, in Sept., 1442). His original title was that of earl of March. It would be quite impossible, in the short space at our disposal, to clear our way through the jungle of family relations by which Richard duke of York, the father of Edward IV., traced his right to the throne. Suffice it to say, that in 1460 the bloody struggle between the *Yorkists* (the party headed by Richard duke of York, who *at first* professed only a desire to remove from the king, Henry VI., his pernicious councilors) and the *Lancastrians* (the party of the sovereign) ceased for a moment. The Yorkists, on the whole, had been victorious on the battle-field, and their leader contrived to induce parliament to appoint him Henry's successor. Shortly after, however, Henry's wife—the brave queen Margaret—raised an army in the n., and on the 31st Dec., 1460, encountered and overthrew York on Wakefield Green, the duke himself being slain. But this reverse was compensated for by the success of his son Edward, who, after routing the royal or Lancastrian forces, under the earls of Pembroke and Ormond, at Mortimer's Cross, near Hereford, marched towards London, which he entered on the 28th Feb., 1461. He immediately presented his claim to the crown to parliament, which admitted its validity, and on the 4th of Mar. ascended the throne as Edward IV., amid the acclamations of the citizens of London, with whom he was a great favorite. For three years

he had to struggle hard to keep his position. His first victory over the Lancastrians was obtained at Towton, in Yorkshire, 29th Mar., 1461, hardly one month after his accession. Finally, in May, 1464, a few days after the victory at Hexham, Henry himself fell into E.'s hands. This closed the war for a time. About this time, E. married Elizabeth Woodville, widow of sir John Grey. This marriage gave great offense to the earl of Warwick, by far the most powerful of E.'s adherents, who was at that time engaged in prosecuting an alliance between E. and the sister-in-law of Louis XI., king of France. In 1469, Warwick openly declared against him, joined queen Margaret, and compelled E. to flee the country. King Henry was released from the Tower, where he had been a prisoner for six years, and once more invested with royal authority. But in the spring of 1471, E. landed at the Humber, proceeded swiftly to London, seized the person of Henry, and was again hailed king by the inhabitants. Warwick now gathered an army, and hurried to encounter him. The two met at Barnet, where Warwick was defeated and slain, April, 1471. In the course of the next month, E. routed the Lancastrians at Tewkesbury, capturing both queen Margaret and her son, prince Edward. The latter was murdered the day after the battle; the queen herself, after an imprisonment of four years, was ransomed by the French monarch. E. died 9th April, 1483, the later years of his reign presenting few political incidents of any moment. E. was an able commander, as his numerous victories show, but he was dissolute in the extreme. It was during his reign that printing was introduced into England, as also silk manufactures. In law, few notable changes occurred, but the practice of indirect pleading dates from this period, which is also illustrated with the names of distinguished legists, such as Littleton and Fortescue.

EDWARD V., son of the preceding, was b. 4th Nov., 1470. The story of his life is brief and tragic. At the death of his father, he was living at Ludlow, in Shropshire, a boy of thirteen. When the news reached Ludlow, earl Rivers, his uncle by the mother's side, set out with him for London. Richard duke of Gloucester, however, contrived to obtain possession of his person at Northampton, and brought him to the capital himself, in the beginning of May, 1483. Towards the end of the same month, Richard was appointed protector of the kingdom. About the middle of June, the young duke of York, brother of Edward V., also fell into his hands. The two hapless boys were then removed to the Tower, and were never more heard of. The general, and in all probability the correct opinion is, that they were murdered by commad of Gloucester himself. All attempts to whitewash "the bloody and devouring chief" have signally failed.

EDWARD VI., son of Henry VIII. by his wife Jane Seymour, was b. at Hampton Court, 12th Oct., 1537. The events which happened during his brief reign were of great importance, but they were of course brought about by others, E. being too young (he was not sixteen when he died) to exercise any personal influence on the statesmen or the tendencies of his age. On the death of Henry in 1547, Edward Seymour, earl of Hertford, became protector of the kingdom. He was attached to the principles of the reformation, and during his rule, great strides were made towards the establishment of Protestantism in England. The images were removed from the churches; refractory Roman Catholic bishops were imprisoned; the laity were allowed the cup at the ceremony of the Lord's supper; all ecclesiastical processes were ordered to run in the king's name; Henry's famous six articles (known as the Bloody Statute) were repealed; a new service-book, compiled by Cranmer and Ridley, assisted by eleven other divines, was drawn up, and ordered to be used, and is known as the *First Prayer-Book of Edward VI.* (see COMMON PRAYER BOOK); and the celibacy of the clergy ceased to be obligatory. In war, Seymour showed himself to be a brave general. During the first year of his protectorate, he invaded Scotland, on account of the refusal of the Scottish government to fulfill the contract into which it had entered with Henry VIII., by which it was agreed that Mary queen of Scots should marry Edward. The battle of Pinkie followed, on the 10th Sept., 1547, in which the Scots were completely beaten; and Seymour, now duke of Somerset, might have inflicted most serious damage on the whole country if his presence had not been required at home. He returned to find that his brother, lord Seymour, had been caballing against him. Somerset had him arrested, tried, and condemned for treason, and on the 20th of Mar., 1549, he was beheaded on Tower Hill. In the summer of the same year the protector quelled an insurrection of the populace headed by one Kett, a tanner; but in the course of a few months, a more dangerous adversary appeared in the person of John Dudley, earl of Warwick, whose party, by dint of insinuations against Somerset, excited the nation against him, and at last compelled the king to sign his deposition. On the 14th of Oct., Somerset was placed in the Tower; and on the 1st of Dec., 1551, he was tried before the house of lords for treason, condemned, and executed, 22d of Jan., 1552. The people regretted, with good reason, his death, for Dudley was both a worse and a weaker man than himself. Before Somerset's execution, Dudley had been created duke of Northumberland. He was himself (judging from his dying declaration) a Catholic, but he certainly took no means to re-establish the old religion. His great aim was to secure the succession to the throne of England for his family. With this view, he married his son, lord Guildford Dudley, to lady Jane Grey, daughter of the duchess of Suffolk, to whom, by the will of Henry VIII., fell the crown, in default of issue by Edward, Mary, or Elizabeth. Northum-

berland now worked upon the weak and dying Edward to exclude Mary and Elizabeth, and nominate lady Jane Grey as his successor. E. at last consented, and a document settling the succession on this lady was drawn up in June, 1552. The king lived only a few weeks after, dying on the 6th of July. Subsequent events entirely frustrated Northumberland's design. King E., during his short reign, founded a great number of grammar-schools, which still exist, and are known as *king Edward's schools.*

EDWARDES, Sir HERBERT BENJAMIN, 1819–68; b. England; early in army service as a cadet in India; in 1841, ensign of the 1st Bengal fusiliers, with which regiment he remained five years, improving himself especially in the native languages. In the Sikh war he was aid to viscount Gough, the English commander-in-chief. After the war he continued in responsible positions in the civil service, but was soon again on military duty, doing service so brave and important as to receive the thanks of parliament. He was commissioner of the Peshawur frontier at the time of the Sepoy rebellion, and raised and sent a large force to aid in the siege of Delhi. For his many services he received the successive decorations of C.B., K.C.B., and K.C. of the star of India. He received the degree of LL.D. from the university of Cambridge. He published *A Year on the Punjab Frontier in* 1848–49.

EDWARDS, a co. in s.e. Illinois, bounded on the s.e. by the Little Wabash, reached by a branch of the Louisville, New Albany and St. Louis railroad; 200 sq.m.; pop. '70, 7,565. The surface is forest and prairie, producing wheat, corn, wool, tobacco, etc. Co. seat, Albion.

EDWARDS, a co. in s.w. Texas, in a rough region; 1225 sq.m.; entirely unsettled in 1870.

EDWARDS, BELA BATES, D.D., 1802–52; b. Mass.; graduated at Amherst, and studied theology at Andover theological seminary. In 1828, he was secretary of the American education society, and from 1828 to 1842, the editor of the organ of that society, the *American Quarterly Register.* In 1833, he started the *American Quarterly Observer,* which was soon united with the *Biblical Repository,* Dr. Edwards continuing as editor. From 1844 to 1852, he was editor of the *Bibliotheca Sacra.* In 1837, he was professor of Hebrew at Andover, and in 1848, of biblical literature. Among his works are the *Eclectic Reader; Biographies of Self-taught Men;* the *Missionary Gazetteer;* sermons, addresses, etc. In 1853, selections from his sermons, etc., were published with a memoir by prof. Edwards A. Park, who had long been his intimate friend and associate in literary and theological labors. In Edwards there was a rare combination of exact scholarship and critical thought, with a wide range of sympathy, both intellectual and moral, while his character was lovely with the modesty and gentleness which belong to the highest strength. These characteristics showed themselves in his English style, which was singularly pure, elegant, and vigorous.

EDWARDS, BRYAN, 1743–1800; b. England; when a boy he went to Jamaica, where the generosity of his uncle enabled him to finish his education. When his uncle died he inherited his vast estate. He was a member of the colonial assembly, but is best known by his *History, Civil and Commercial, of the British Colonies in the West Indies.* He also published a *History of San Domingo,* just after the great massacre. In 1796, he returned to England, and became a member of parliament, holding the place until his death.

EDWARDS, GEORGE, 1693–1773; b. England. He traveled in northern Europe studying natural history, and published *History of Birds,* in 4 vols., at intervals of several years; and *Gleanings of Natural History.* He was a member of nearly all the leading scientific societies.

EDWARDS, HENRI MILNE. See MILNE-EDWARDS, HENRI.

EDWARDS, JONATHAN, a celebrated American divine and metaphysician, was b. at Windsor, in the state of Conn., 5th Oct., 1703, entered Yale college in 1716, took his degree of B.A. in the following year, and in 1722 was licensed to preach the gospel. Towards the close of 1723, he was appointed tutor of Yale college, an office which he filled with distinguished success. In 1726, he accepted an invitation to become colleague to his maternal grandfather, Mr. Stoddard, in a church at Northampton, and was ordained in Feb., 1727. Here he labored with intense zeal for more than 23 years, at the end of which period he was dismissed by his congregation. The immediate cause of the rupture between him and his hearers, was his insisting that no "unconverted" persons should be allowed to approach the Lord's table; but some years before, he had alienated the regards of a large number of the influential members of the church by denouncing the reading and circulation of certain books which were immoral and injurious, and by attempting to make a public example of the offenders. E. was a powerful and impressive preacher, somber and even gloomy in his religious opinions and sentiments, but earnest, unaffected, and nobly conscientious. During the famous "revival" of 1740–41, he was much sought after as a preacher, and is in fact often regarded as the originator of that movement. Certain it is that as early as 1734, a local manifestation of religious enthusiasm had taken place in his own parish, of which he published an account, entitled *A Faithful Narrative of the Surprising Work of God, in the Conversion of many Hundred Souls in Northampton.* The quarrel between E. and his congregation shows, however, that the "revival" had not exercised any very strong

influence on the community in general, since only a few years elapsed between the ecstasies of devotion and the circulation of obscenity. After his dismissal in 1750, E. became a missionary among the Indians of Massachusetts. While residing at Stockbridge in that state, he composed his famous treatises on the *Freedom of the Will* and *Original Sin*. In 1757, he was chosen president of Princeton college, New Jersey, whither he proceeded in Jan., 1758, but was cut off by small-pox on the 22d of Mar. in the same year.—E. will always be considered a master in dogmatic theology. Calvinism had probably never so powerful a defender. According to the late Robert Hall, "he ranks with the brightest luminaries of the Christian church, not excluding any country or any age since the apostolic." His great characteristics are depth and comprehensiveness of argument; and were it not that the age for such discussions as E. loved is gone by, few writings would be more worthy of patient study than those of this illustrious divine. Besides the works already mentioned, E. wrote a *Treatise concerning Religious Affections;* the *History of Redemption;* a *Dissertation concerning the End for which God created the World;* and a *Dissertation concerning the True Nature of Christian Virtue*. The last three were posthumously published. A complete edition of E.'s works was published by Dr. Timothy Dwight in 10 vols. (1809), and another at London in 1817. A third was published in 1840, containing an essay by Henry Rogers, and a memoir by Sereno E. Dwight.—JONATHAN EDWARDS, D.D. (born 1745, died 1801), the son of the preceding, was a person of similar character to his father, and, curiously enough, experienced similar vicissitudes of fortune. Both were tutors in the seminaries in which they were educated; were dismissed on account of their religious opinions; were settled again in retired situations; were elected to the presidentship of a college; and in a short time, after they were inaugurated, died at nearly the same age. The younger Edwards was also a writer of sermons and theological treatises.

EDWARDS, JONATHAN (*ante*), in all accounts given concerning him, is sufficiently celebrated as a severe reasoner and profound writer on metaphysical themes. But they who would understand the influence which he has already exerted, and estimate rightly that which he will continue to exert, must not neglect other points of his nature and work. 1. His humility, modesty, and serenity of spirit endeared him to his friends and made him appear amiable to all who conversed with him. As a Christian he was an example of rational virtue and religion. In him men saw a rare assemblage of spiritual graces united with the richest mental gifts. He read all useful books that he could procure, especially those on theological subjects, examining both sides of a question, studying views which to him were erroneous, and investigating the arguments of extreme infidelity. But the Bible he studied more than all other books. His intimate acquaintance with it is conspicuous in all his writings. Few men were less under the bias of education or of bigotry. He exerted all his powers to find out truth, searching for it as for hid treasure. Every valuable thought he pursued at once as far as he then could. He read pen in hand, not so much to take notes of other men's thoughts as to secure his own. His scholarship was remarkable for the day in which he lived and the opportunities which he enjoyed. Born in an obscure village of a new and thinly settled colony, with the forests around him, and separated by 3,000 m. of ocean from the seats of art, refinement, and knowledge; educated at a college (only three years older than himself) that offered advantages less than academies now supply, he passed all the rest of his years amidst the cares of a laborious profession, on the very frontiers (and some of those years in the heart) of savage life. Yet, with all these hindrances, he was a proficient in classic and Hebrew literature, physics, mathematics, history, chronology, mental philosophy, and ethics. His greatest work was written in four and a half months, during which he carried on the correspondence of the mission and preached, each Sabbath, two sermons in English, and two by interpreters to two Indian congregations, besides catechising the children of both tribes. His neglect of style as a writer is to be regretted. His works were printed very much as first written. Yet a marked improvement was effected in his later years. The style of the *Inquiry Concerning the Freedom of the Will* (written, as has just been said, in so short a time) is considered by competent judges to be as correct as that of most metaphysical treatises. 2. In the early part of his life he acquired a very high character as a minister and preacher. Most of his hearers felt and acknowledged his power. Long before the publication of his writings, his fame as a preacher had spread through the colonies and into Great Britain. To eloquence, as many use the word, he had indeed no claim. He exhibited no studied varieties of voice, no strong emphasis, no graceful gesticulation, no attempt at elegance of style or beauty of illustration. But if eloquence be the power of presenting important truth to an audience with overwhelming weight of argument, and with the whole soul of the speaker thrown into every part of the conception and of the delivery, so that the attention of all is riveted until the end, and impressions are made which cannot be effaced, then Jonathan Edwards has been justly pronounced one of the most eloquent preachers of his own or of any age. His solemn consciousness of the presence of God controlled his preparations, was manifest in his services, and had an irresistible effect on his congregations. His knowledge of the human heart, springing from knowledge of the word of God, skill in mental philosophy, and his own personal experience,

enabled him to speak to the consciousness of his hearers. His theological learning was so complete, and his general information so extensive, that he could impart variety and richness of thought to his sermons, and bring illustrations to bear on every point. From first to last his aim was simply the salvation of his hearers and the glory of God. In the introduction to his sermon he explained the passage from which he was to preach, and with great skill presented its whole drift in all its bearings. In the body of the sermon he did not attempt an elaborate proof of his doctrine, but rather placed it before his hearers as a fact, and painted it to their imagination. He laid out his strength in the application, speaking to the consciences of his hearers, applying to different characters the important ideas of the sermon, and closing with a solemn and earnest appeal to every feeling and principle of human nature. He counseled, exhorted, warned, expostulated, as if he was determined not to stop without convincing and persuading every man. 3. While his visits among his flock were, in a great degree, restricted to the sick and afflicted, he was eminently faithful and successful in other departments of pastoral work, especially in extraordinary labors during "revivals" which sprang up under his ministry, and in conversing with those who sought spiritual counsel. His study was at times thronged with persons who came to lay open to him their minds and hearts. 4. His theological treatises, especially, have made him extensively known, and are the foundation on which his highest reputation will ultimately rest. (1) In these he is distinguished for scriptural views of divine truth, adducing many passages in illustration and proof, examining them critically, arranging them carefully, and drawing conclusions from them with fidelity and skill. He seldom introduces any hypothesis of his own, and betrays little confidence in his own reason unless it is supported by the oracles of God. (2) He presents no partial or contracted views; all are simple, great, and sublime. His mind was too expanded to regard the minor distinctions of denominations and sects. He belonged to no church but the church of Christ, contended for nothing but the truth of God, and aimed supremely at holiness and salvation. His labors coincide so completely with those which the gospel prescribes, that no denomination can appropriate him exclusively to itself. His originality in argument is striking and continued. He never walks in a beaten path. His positions, arguments, and conclusions are his own; and he did much to render theology a *new* science. (3) In controversy he maintained an excellent spirit. His integrity and fairness were conspicuous. The idea of employing sophistry in his argument seems never to have occurred to him as a possible thing. He was kind and sincere; fair in stating the real point in debate; and candid towards his opponents. He carefully avoided personalities and the imputation of unworthy motives to those from whom he was compelled to differ. These excellences as a disputant appear the more remarkable when the circumstances in which he wrote, and the topics which he handled, are considered. The treatise on the affections was written in the heat of a violent controversy which divided and agitated the whole country. In his works on the will, original sin, and justification, he dealt with subjects which had aroused bitter opposition, and replied to persons who had boasted of their victories in vain-glorious and irritating terms. His book on qualifications for communion was composed in the midst of a furious parochial storm, which did not ruffle his temper, although it drove him from his parish and home. (4) While his manner was courteous and his temper undisturbed, his arguments were, for the most part, unanswerable. They derived their strength from the conclusiveness of his reasoning, the employment of different trains of proof, all converging to one result, the anticipation of objections which might be taken to his view, and the skill with which he brought the *reductio ad absurdum* to his aid. The most metaphysical of his writings—*On the Freedom of the Will*—has been described by high authority as "a book which never has been, and never will be, answered." His most practical treatise—on *The Qualifications for Communion*—being an attack on a favorite scheme of lax religionists, aroused indignation all over the country. Yet after a disastrous controversy it has so changed the opinions and practice of the New England ministers and churches, that a mode of admission to church-membership or to a *quasi* membership, then almost universal, is now disused. (5) In all his writings, even the most metaphysical, he aimed at the most important practical results. In them all his immediate success was great, and by them his influence on doctrine and piety has been extended through Christian schools of theology, pulpits, churches and homes. Some of the themes on which he has given light are the following: God's end in creating this material and spiritual universe; the nature of his government over intelligent minds, and how it is consistent with their freedom; the nature of the virtue which they must possess in order to secure his approbation; the source, extent, and evidences of human depravity; the series of events by which redemption is effected; the qualifications for the church to which the redeemed belong; the grounds on which they are justified; the nature and evidences of the religion imparted to them by the spirit of grace; the distinguishing marks and effects of revivals of religion produced by the effusion of divine influence on men; the inducements to united and special prayer that such effusions may be abundantly enjoyed by the church of God. Why—it has often been asked—did such a man die at the age of 54 years, in the fullness of his powers, and just when he had been called from the wilderness to fill one of the highest stations in the land?

EDWARDS, PIERREPONT, 1750–1826; son of Jonathan, the theologian. He served in the revolutionary army; practiced law; and was a member of congress in 1787. He was U. S. district judge for Connecticut at the time of his death.

EDWARDS, TRYON, D.D., b. Conn., 1809; great-grandson of Jonathan, the theologian; graduated at Yale, studied theology at Princeton, and law in New York; settled in the ministry at Rochester, N. Y., in 1834, and afterwards at New London, Conn. Among his publications are *Christianity a Philosophy of Principles; Self-Cultivation;* etc. He has edited *Charity and its Fruits; Select Poetry for Children and Youth*; *Jewels for the Household; The World's Laconics; Wonders of the World;* and many issues of the *Family Christian Almanac.*

EDWARDS, WILLIAM, 1770–1851; b. N. J.; grandson of Jonathan. He introduced valuable improvement in the manufacture of leather, whereby tanning was accomplished in a quarter of the usual time. To be in proximity to abundance of hemlock bark, he set up a model tannery in the Catskill mountain region. His many improvements greatly advanced the production of leather in this country.

EDWIN, an English Saxon prince, was the son of Ella, king of Northumbria, who died about 589. He succeeded to the throne at the age of three years, but a neighboring potentate, Ethelfrith, invaded and conquered his territories, whereupon the infant E. was carried into North Wales, and was there educated. When he grew up to man's estate, Ethelfrith, fearing that his power would not be secure so long as E. lived, forced him from his asylum, and for many years he wandered about a disguised fugitive. Reaching East Anglia, he claimed the protection of king Redwald, which was readily granted. While residing there, Ethelfrith sent messengers to Redwald, requiring him to deliver E. into his hands, and threatening war in the event of a refusal. Redwald promised to accede to the request. A friend made known the resolve to the prince, and counseled flight; to this E. would not consent, but sat down without the palace, brooding over his misfortunes. While sitting there, Bede states that an unknown person approached him, and promised release from all his sufferings, if he would listen to what should be afterwards taught him. The apparition then placed its hand upon his head, and bidding him remember the interview and the sign, disappeared.

Redwald's queen pleaded the cause of E., and he finally determined to protect him. Raising an army, Redwald surprised Ethelfrith on the Idel, in Nottinghamshire, and defeated and slew him in 617. When E. regained his kingdom, he wooed Edelberga, daughter of Ethelbert of Kent. Her brother, who was a Christian, objected to her alliance with an idolater; but E. promised that he would not interfere with her religious belief. The princess became his wife; and Paulinus, who had been sent by Gregory to assist Augustine in his mission, accompanied her as her bishop.

About this time, E.'s life was attempted by an assassin, sent by the king of Wessex. He escaped with a slight wound, and on the same night the queen was delivered of a daughter. The king thanked his idols for the birth, but Paulinus directed his thankfulness to the Christian Saviour. The king promised to accept the new faith, if Heaven would grant him victory over the king of Wessex. His child and 11 of his household then received the rite of baptism. Raising an army, he defeated his foe, but delayed to fulfill his promise. Paulinus, having heard of the apparition which appeared to him while residing at the court of Redwald, one day entered the apartment in which E. sat, and placing his hand upon his head, asked him if he remembered the sign. The king was visibly affected, and at once assembled his witenagemôte to deliberate on the matter of the new religion. Coifi, the high-priest, spoke first, and intimated his willingness to desert the idols, and embrace the Christian faith. A thane next rose and pronounced the beautiful speech which has been versified by so many poets, but which is most effective in the simple serious Saxon of the chroniclers. Coifi then headed the people in destroying the idol temple.

E. and the nobility of his kingdom were baptized in the eleventh year of his reign. Thereafter, he became the most powerful prince in England. He subdued a part of Wales, and his power extended northward to the Lothians. In 634, he fell in battle at Hatfield Chase, in Yorkshire; and in that disastrous fight, one of his children, and the greater portion of his army, perished. The history of this prince has been made the subject of a beautiful poem (*Edwin of Deira,* 1861) by Alexander Smith.

EDWY, EADWIG, or EDWIN (THE FAIR), about 938–58; king of the Anglo-Saxons; eldest son of Edmund I. He succeeded his uncle Eldred in 955. Little is known of his short reign except that he was at enmity with Dunstan, who bitterly opposed his marrying Elgiva. Dunstan was banished from the kingdom, but not long afterwards was restored by the Mercians, who had revolted from Edwy, and proclaimed Edgar king.

EECKHOUT, GERBRAND VAN DEN, 1621–74; a painter, b. in Amsterdam; a pupil of Rembrandt, whose style he successfully imitated. As a portrait painter he had a peculiarly superior talent for expressing character. Among his best compositions are "Christ in the Temple," and "Haman and Mordecai."

EECLOO, a t. of Belgium, in the province of East Flanders, stands on the high-road between Ghent and Bruges, and is 12 m. n.w. from the former. It is clean and well built; and has manufactures of woolens, cottons, hats, tobacco, chocolate, soap, etc.;

also breweries, distilleries, vinegar-works, salt-refineries, dye-works, oil-mills, and a thriving trade in linen, cattle, and timber, as well as in grain, for which it has a large weekly market. Pop. '73, 9,564.

EEL, a name popularly given to all serpent-shaped or worm-shaped fishes, and sometimes extended to other animals of similar form, but otherwise extremely different, as the *eels* in paste, in vinegar, etc. The fishes to which this name is most commonly applied are *malacopterous* fishes destitute of ventral fins, and having the body covered by a soft thick slimy skin, the scales very minute, and often almost invisible, or entirely wanting. Most of them were included in the Linnæan genus *muræna*, and now constitute the family *muræniдæ*, divided by some naturalists into the families *synbranchidæ*, *muræniдæ*, *anguillidæ*, *congeridæ*, and *ophisuridæ*. All these have the skeleton destitute of ribs, and the fin-rays not jointed; whilst the *gymnotidæ*, including the electric eels (see GYMNOTUS), have ribs encompassing the belly, and the fin-rays jointed or branched. In all the eels, the gill-orifices are very small, and are situated far back, so that there is a long passage from the gill-chamber outwards; and hence, the gills not soon becoming dry, these fishes can remain out of water for a considerable time without injury, and some of them occasionally leave it of their own accord. The smallness of the gill-opening is also regarded as probably indicative of feebleness of respiration; and this, as in reptiles, is connected with extreme tenacity of life.—The *synbranchidæ* have the gill-passages so united under a common integument, as to present externally only a single orifice. They are almost destitute of fins. The species are few, and found only in tropical and sub-tropical seas.—The *muræniдæ* are also generally destitute of fins, or nearly so; they are all destitute of scales. They are all marine.—The *anguillidæ*, on the contrary, are fresh-water fishes, although some of them occasionally visit the sea. They have pretty large pectoral fins, anal and dorsal fins extending to and encompassing the tip of the tail, and numerous longish scales imbedded in groups in the skin, so as to resemble lattice-work. To these the congers (q.v.), although marine, are very nearly allied. The *ophisuridæ*, or snake-eels (q.v.), of the Mediterranean and other seas, are more widely different, and are easily distinguished by the tail ending in a conical finless point.

Until recently, all the British fresh-water eels were confounded together as of one species (*anguilla vulgaris*): Mr. Yarrell was the first accurately to distinguish them, and to show that there are at least three, if not four species, differing considerably in form, and in anatomical characters, as the number and form of the vertebræ, etc. Two of these seem to be very generally diffused, the SHARP-NOSED E. (*A. acutirostris* or *A. vulgaris*) and the BROAD-NOSED E. (*A. latirostris*). The difference in the form of the snout, which these names indicate, is very marked and obvious, and the general form of the sharp-nosed E. is also more slender.—The SNIG E. (*A. mediorostris*), found in some of the English rivers, is intermediate in the form of its snout, and is considered superior to the other kinds for the table. Its cervical vertebræ are destitute of the spinous processes which are found in both the other species. It is comparatively small. The sharp-nosed E. seems to attain the greatest size, sometimes almost 30 lbs. weight. It migrates on the approach of winter to the warmer brackish water of estuaries, often entering water which is perfectly salt; or if migration is impossible, it buries itself in mud. Eels are taken in great numbers during winter by means of *eel-spears*, or forks with several prongs, plunged into the mud. Sometimes they are digged out of the mud of river-banks, where large numbers are found congregated together. The eels which descend to estuaries or to the sea deposit their spawn there, and countless multitudes of young eels ascend rivers in spring, The passage of the young eels is called on the Thames the *eel-fare*, from a Saxon word signifying to pass or travel. So strong is the instinct which impels them, that they surmount obstacles apparently far more than sufficient to arrest their progress; they have been seen to ascend the large posts of flood-gates, "those which die, stick to the posts; others, which get a little higher, meet with the same fate, until at last a sufficient layer of them is formed to enable the rest to overcome the difficulty of the passage." Young eels have also sometimes been met with in large numbers performing migrations on land among moist grass, generally in the evening or during the night; but the purpose of these migrations is not very well understood, nor are they known to take place with regularity.—Those eels which cannot migrate to the sea, breed in inland rivers and lakes.

Eels are very averse to cold, and to this is ascribed their winter descent to brackish water, or hiding of themselves in mud. The number of known species is large, but they all belong to the temperate and warmer regions of the globe. In these, also, the marine fishes to which the name E. is sometimes extended, chiefly abound.

There is a prejudice in some countries—particularly in Scotland—against eating eels, on account of their serpent-like appearance; but generally, as in England, they are highly esteemed. The London market is very largely supplied with eels from Holland; they are sent over alive in welled vessels.

There are various means beside those already noticed employed for the capture of the eel. Weirs and stages are erected across rivers, and baskets, or *bucks*, as they are termed, fixed in them for the taking of the eels during their migrations. These baskets are of large size, and shaped like a huge Chinese jar, in the mouth of which is fitted a

sort of funnel-shaped mouse-trap entrance, composed of flexible withy rods coming inwards to a point, and through which the eels can easily force their way; but when they turn about to find the entrance again, it is closed against them. When the eels are running, as it is termed—that is, during their migrations—many hundredweights are often taken in these basket-traps in a single night. *Eel-pots* are also used for their capture. These are of a similar nature to the bucks, but are smaller and more slender. They are sunk, by means of bricks tied to them, in the most likely runs or narrow spaces between weeds, or close to banks, and through which eels are likely to run. After a thunder-storm, eels always run well, as it disturbs them greatly. Eels are also caught by means of night-lines. These are long lines with heavy weights at each end, and in the middle if necessary, with hooks tied on every yard. These hooks are baited with pieces of dead fish, minnows, or worms. The line is sunk, and laid across stream—or, if fishing for conger-eels, in the sea—with, if it be thought necessary, a small buoy at one end, to recover the line by. These eel-lines should be hauled as early in the morning as possible, or the best eels will be found to have worked themselves off, leaving a mass of knots and slime behind them, to show where they have been. *Snigging* is a favorite amusement with some anglers. A rod or a long stick is provided, bent round at the slender end like the top of a very well used fishing-rod; on the point is fixed a single ring; through this ring is passed a piece of string; one end of this is held in the fisherman's hand. To the other end, on some fine but strong cord, is fastened a stout darning-needle, tied to the cord by the middle. The needle is then baited, or thrust lengthwise into a large lob-worm, until the fine cord alone comes out at the head of the worm. The worm is then drawn up to the ring of the rod. The fisherman then seeks for some hole in which he thinks an E. may be, and applying the point of the rod, pushes the worm into it. As soon as the fisherman believes an E. has swallowed the bait, he gives a slight pull to the string; and the needle, which has gone down the E.'s throat inside the worm perfectly straight, being tied by the middle, turns crosswise in the E.'s throat or stomach, and hooks him. *Clod-fishing* is thus practiced: a quantity of lob-worms are strung by means of a needle on to some stout worsted until a considerable bunch of them is obtained; this is tied to the end of a cord, which is again tied to a stout pole. When the eels are on the move, the fisherman takes his station with a pail half full of water within reach; he then drops his clod into the water, and allows it to sink to the bottom. As soon as he feels an E. tugging at it, he steadily and quickly, but without jerk, raises the bait from the water. The E. frequently has its teeth so entangled in the worsted as to be unable to let go, and thus is lifted from the water. The bait is held over the pail, a shake or two dislodges the E., and the clod is then dropped into the water again, to fish for more. Sometimes two or even three eels come up at once, and a great number are often taken thus.

EE'LEE, or ILI, a river of central Asia, rising in China and running w. about 600 m. to lake Balkash. The valley of the Eelee is the usual route between Russia and China.

EE'LEE, or GOOLDJA, a city in the extreme w. of China, in central Asia, on the river of the same name, 43° 46′ n., and 82° 30′ e.; pop. said to be 80,000. It is an important commercial center, and was formerly the place to which Chinese criminals were banished.

EEL-POUT, a name given in some parts of England to the burbot, and on some parts of the Scottish coast to the viviparous blenny.

EELS in paste, vinegar, etc., are animalcules (*infusoria*) of the family *vibrionidæ*. When at rest, they appear like very minute hairs, or bits of very fine thread. Some of them wind themselves about in a spiral form when they move. The species are numerous, and they occur in almost all vegetable substances beginning to corrupt and undergo decay, which they hasten. They are found also in decaying animal matter, and have recently been detected in diseased animal tissues; but the species found in such situations have not the elongated form which has given the name E. to those inhabiting paste a few days old, stale vinegar, etc., or occurring in diseased parts of living vegetables. Whether or not the origination of disease is to be ascribed to their presence in animal tissues, is not yet well ascertained; but in living vegetables this appears to be certainly the case, particularly in the disease of wheat called ear-cockles (q.v.).

EFAT. See SHOA, ABYSSINIA.

EFFARE, or EFFRAYÉ (Fr.), in heraldry, signifies that the animal to which it refers is to be represented as rearing on its hind-legs, as if it were frightened or enraged.

EFFECT. The general impression produced on the mind by the first sight of a picture or other work of art, or the impression which it produces when seen from so great a distance as to render the details invisible. The term has reference both to design and coloring, both of which, if correctly indicated, may be judged of with perfect confidence before either has been completed in detail. Bold sketches of their works are generally made by careful artists beforehand, for the purpose of adjusting the composition and coloring so as to produce the desired effect.

EFFENDI, a title of honor among the Turks, bestowed upon civil dignitaries and persons of various ranks, in contradistinction to the title of aga, borne by courtiers and

military men. The word is equivalent to the English sir, or the French monsieur, and is frequently added to the name of an office. Thus, the sultan's first physician is termed *Hakim-effendi;* the priest in the seraglio, *Imam-effendi;* and the minister of foreign affairs was formerly called *Reis-effendi.*

EFFERVESCING DRAUGHTS. See AËRATED WATERS.

EFFIGY (Lat. *effigies*), a likeness or representation either of the whole figure or of the head and face, as on a coin. See BRASS, MONUMENTAL. It is scarcely an artistic word.

EFFINGHAM, a co. in e. Georgia, separated from South Carolina by the Savannah river, and bounded w. by the Ogeechee; crossed by the Georgia Central railroad; 480 sq.m.; pop. '70, 4,214—1704 colored. The surface is level, and mostly covered with forests; soil sand and poor; productions, corn, cotton, and rice. Co. seat, Springfield.

EFFINGHAM, a co. in s.e. Illinois, on Little Wabash river; intersected by the Illinois Central, the St. Louis, Vandalia, and Terre Haute, and the Ohio and Mississippi railroads; 500 sq.m.; pop. '70, 15,563. The surface is mostly prairie and the soil fertile, producing corn, wheat, etc. Copper, iron, coal, and lead are found. Co. seat, Effingham.

EFFLORESCENCE is the term applied to the appearance of a white incrustation on the walls of buildings, or when a salt loses its water of crystallization, and presents a white powdery appearance on the surface. Common washing-soda exposed to the air affords a good illustration of this phenomenon.

EFFRAYÉ. See EFFARÉ.

EFT, a term of Anglo-Saxon origin, applied both to lizards and newts, which—notwithstanding the important differences between them—were until recently confounded even by naturalists. The Scotch word *ask* seems to be the exact equivalent of the English *eft.* In works of natural history, the term eft is now used as synonymous with newt (q.v.).

ÉGALITÉ, PHILIPPE. See ORLÉANS, LOUIS PHILIPPE JOSEPH, *ante.*

EGBERT, the most celebrated of the Anglo-Saxon kings before Alfred, was the son of Alckmund, who is said to have reigned in Kent, and was a descendant of the house of Cerdic. In 787, on the death of Cynewulf, king of Wessex, E. laid claim to the throne, but had to give way to another claimant, Brihtric, who was the more powerful of the two. E. was compelled to flee, and took refuge at the court of Charlemagne. Here he remained for 13 years, until, in 800, on the death of Brihtric, he was summoned to England to fill the throne of Wessex. England was at this time divided into three great sovereignties: Northumbria, extending over what were occasionally the separate kingdoms of Deira and Bernicia; Mercia, which had now subjugated the petty powers of Kent, Essex, and East Anglia; and Wessex, which had absorbed Sussex. For the first nine years of his reign, E. drew no sword. His mild government completed the attachment of his subjects, and the peace which he maintained fostered his strength. In 809, however, he marched against the Britons of the west, and after fighting five years in Cornwall and Devon, he succeeded in subduing the wild tribes to at least a temporary subjection. In 823, the most important event in his career took place. At that time a dispute had arisen between the East Angles and their Mercian conquerors, and the former sent ambassadors to E. imploring aid and protection. E. joined the East Angles with an army which, according to the old chroniclers, had a peculiarly fighting appearance, being "lean, meager, pale, and long-breathed." The encounter between the Mercians and the East Angles with their ally took place at Ellandûn (the modern Wilton, according to some), where a furious battle was fought, in which the Mercians were defeated with great slaughter. By this battle the power of Mercia was broken, and Essex and Kent, formerly Mercian provinces, became incorporated with Wessex. For four years after the great battle of Ellandûn, Mercia remained the seat of discontent and strife, and E., in 827, taking advantage of his opportunity, led thither an invading force, and reduced the country to a state of vassalage. Turning next his arms against Northumbria, he compelled that sovereignty also to acknowledge his supremacy (827-828). He afterwards penetrated into Wales, where, in like manner, success attended his arms.

E., now virtually king of England, though both he and his successors until the time of Alfred were in the habit of designating themselves only kings of Wessex, found it necessary, after a few years' comparatively peaceful rule, to direct his attention to a new and foreign enemy. The Danes, who had been making frequent descents upon the island since 832, and who in that year had defeated the forces of E., reappeared in 835 on the coast of Cornwall, where they were joined by numbers of the Cornish Britons. E., however, at the head of his West Saxons, met them at Hengestes-dûn (Hengstone), and in a great battle completely overthrew them. In the following year, he died, after a reign of 37 years.—In E., ambition and prudence, bravery, talent, and courtesy were blended in such a manner as to form a monarch not unworthy to be the first king of England.

EGEDE', HANS, was b. in Norland, in Norway, Jan. 31, 1681, studied in Copenhagen, and was appointed to the church of Vaagen in Norway in 1707. Having determined to proceed to Greenland to convert the natives, he resigned his *cure* at the end

of ten years; and, after devoting himself with assiduity to the study of the language, embarked for Greenland, with his wife and sons, in 1721. He remained 15 years in Greenland, during which time he labored zealously among the people, and by his preaching and teaching secured a permanent footing there for the Christian mission, which owed its origin to him. On his return to Copenhagen, he employed himself in instructing missionaries in the dialects of Greenland; and in 1740, he was made a bishop. He died in 1758. He has described the course and success of his labors in *Det gamle Grönland's nye Perlustration* (Copenh. 1729 and 1741). He was ably seconded in his labors by his wife and his sons, Povel and Niels.—Povel Egede, who was his father's successor in Greenland, and was also a bishop, translated the gospels and several devotional works into the Greenland language, and compiled a grammar and dictionary for the use of the Greenland mission; the latter appeared in 1750 under the title *Dictionarium Grönlandico-danico-latinum*.

EG'ER, a t. and river of Austria, in the province of Bohemia.—1. The town E. stands on a rock on the right bank of the stream of the same name, is 90 m. w. of Prague, and near the Bohemian frontier. Formerly, it was a border fortress of some importance; its walls, however, have been almost entirely pulled down, and its fosses filled up with rubbish. Among the conspicuous edifices of E. are its churches, of which there are four —one of them, the deanery church, very handsome; the market-place, within which is the large town-hall; two monasteries, a Dominican and a Franciscan; and the barracks. East of the market-place is the house of the burgomaster, in which Wallenstein was assassinated in 1634. The ruins of the imperial burg or citadel, formerly the residence of kings and emperors, is situated in an angle of the fortifications above the river. From the midst of these ruins rises a singular square black tower, constructed of masses of volcanic tufa. The double chapel, consisting of two stories, the upper supported by graceful marble pillars, is a fine specimen of Gothic architecture. An avenue, nearly three m. long, leads from E. to Franzenbrunn (q.v.). E. has manufactures of broadcloth, kerseymeres, cottons, chintz, leather, soap, etc. Its industry and commerce have greatly increased since it became a point of junction of five railways. Pop. '69, 13,463. —2. The river E. rises 12 m. n.w. of the t. of E., flows first s.e. to E., then advances in a general n.e. direction, passing Elbogen, Saaz, Birdin, and Theresienstadt, near which town it joins the Elbe, after a course of about 120 miles. Its current is rapid, and no part of its course is navigable.

EGE'RIA was the name of the Nymph or Camena, from whom, according to the legend, king Numa received the ritual of public worship which he established in Rome. The grove where Numa met the goddess to receive her instructions was dedicated by him to the Camenæ. Roman legends speak of two groves dedicated to E.—one near Aricia, the other before the Porta Capena at Rome, where the grotto of E. is still shown.

EGERTON, Francis. See Bridgewater, *ante*.

EGG, *Ovum*. In a great majority of the different kinds of animals, reproduction takes place by means of eggs; in other words, the animals are *oviparous*. It is only in the *mammalia* that we find animals truly viviparous; whilst the *marsupial* quadrupeds and the *monotremata* form connecting links, in this part of their natural history, between the mammalia which are viviparous in the fullest sense of the term, and the warm-blooded animals (birds) which are oviparous.

To the articles Reproduction and Development of the Embryo, we must refer for an exhibition of the differences between oviparous and viviparous reproduction, and of that original and essential agreement in important particulars, which has been strongly asserted in the saying, *Omne animal ex ovo* (Every animal is produced from an egg). To the article Development of the Embryo also reference must be made for what may be called the *history* of the E., and the development and uses of its several parts.

The number of eggs varies extremely in different animals, some birds producing only one at a time, or in a year, others twenty or nearly so, whilst the roe of the herring, cod, and many other fishes, contains myriads of eggs. The eggs of some animals are enveloped in a gelatinous mass; those of some are joined together, and are laid in a kind of string; those of others are connected together in various ways. For notice of such peculiarities, we must refer to the articles on different classes of animals.

The economical uses of eggs are well known. The eggs chiefly used are those of birds, although the eggs of turtles are also in great repute as an article of food and luxury, and those of fresh-water tortoises are valued for the oil which they yield. The birds' eggs chiefly used for food are those of the species commonly domesticated as poultry, and others allied to them—gallinaceous birds and web-footed birds. Of gallinaceous birds, the common domestic fowl, the turkey, the peahen, and the guinea-fowl, produce the eggs most generally used and brought to market in different parts of the world; of web-footed birds, the common duck is in this respect the most important, although the eggs of other *anatidæ* are also used for food, and those of some of the other web-footed marine-birds are much sought after by the inhabitants of the wild and rocky shores which they frequent. Thus, the eggs of gulls and guillemots afford an important article of food to the people of St. Kilda, and of some of the Orkney and Shetland

islands, as well as to the inhabitants of Iceland and other far northern regions. It is in quest of eggs, as well as of young birds, that the dangers of the most tremendous precipices are braved by men whom their companions let down by ropes, and who gather the eggs from the rock ledges. The coasts of Labrador are also visited by *eggers*, who collect the eggs of sea-birds, and carry them for sale to some of the American ports. The eggs of some of the sea-birds of the West Indies are of considerable commercial importance. See EGG-BIRD.

EGG, AUGUSTUS LEOPOLD, 1816–63; b. London; painter and member of the royal academy. He was a well-trained and talented painter of *genre*, chiefly of compositions from poets and novelists. At the time of his death he might be ranked among our best painters in his special class, but he had no marked originality of style. Among his works are "Queen Elizabeth Discovers She is no Longer Young;" "Peter the Great Sees Catherine for the First Time;" "Charles I. Raising the Standard at Nottingham;" "The Night Before Naseby;" and the dinner scene from the *Taming of the Shrew*.

EGG, CHEMISTRY OF. An ordinary good-sized hen's egg weighs about 1000 grains, of which the white constitutes 600 grains, the yolk 300, and the shell 100. The white or glaire of the E. is a strong solution of albumen (q.v.) in water, and whilst readily miscible with water in its ordinary state, it becomes insoluble when subjected to heat, as in boiling an egg. In 100 parts, the white or glaire of E. consists of—water, 80; dry albumen, 15½; salts, etc., 4½. The yolk or yelk of the egg is composed of a strong solution of albumen, through which multitudes of minute globules of oil are suspended, which render it essentially an emulsion. In 100 parts, it consists of—water, 53¾; dry albumen, 17½; oil (with small proportion of salts), 28¾.

EGG, or EIGG, an island 12 m. off the w. coast of Inverness-shire, and 8 m. s.w. of the s. point of Skye. It is 4½ m. long by 2½ broad. It consists chiefly of trap, which in the n. alternates with sandstone and limestone, the latter rocks containing oolitic fossils, carbonized wood, and coal. The scuir of Egg, in the s.w., rises 1339 feet. The upper 470 ft. of this hill is a mass or vein of pitchstone, 1¼ m. long, and 100 ft. broad. Some of the pitchstone forms straight, inclined, or curved columns, from a few inches to nearly two feet in diameter. In one place, the pitchstone overlies red sandstone, conglomerate, trap, and the silicified wood of an oolitic pine. In the s. part of the isle is a large cave, entered by a narrow opening, through which only one person can creep at a time. Here it is traditionally related that the laird of Macleod, to revenge an injury done to some of his clan, smoked to death all the inhabitants (200 Macdonalds) of the isle, who had hid themselves in the cave. Pop. '71, 282.

EGG, MUNDANE. See MUNDANE EGG.

EG'GA, a large t. of western Africa, Yaruba country, is situated on the right bank of the Niger, in lat. 8° 43′ n., long. 6° 20′ east. It is said to be 2 m. long. Its streets are narrow; the houses are principally huts built of clay, the walls smooth, and stained with indigo. Great quantities of narrow cotton cloth, only a few inches in breadth, and generally dyed blue, are manufactured here. The inhabitants are enterprising and commercial, many of them possess canoes, in which they trade up and down the Niger. These canoes are covered by a sort of shed, under which the traders sleep at night. The chief articles of trade are beautifully carved calabashes, cloth net-work, corn, yams, sweet potatoes, dried fish, and a few European articles, as beads and gunpowder. The population, which is said to be immense, is partly Mohammedan and partly pagan.

EG'GAR MOTH, the name of certain species of moth, of the genus *lasiocampa*, allied to the silk-worm moths. One species (*L. trifolii*), of a uniform foxy ochreous color, with wings expanding about 2 in., produces a caterpillar as thick as a swan's quill, hairy, and ochreous brown, which feeds sometimes on broom, but frequently in clover-fields.

EGG-BIRD, *Hydrochelidon fuliginosum* or *sterna fuliginosa*, a bird of the gull family, sometimes called the SOOTY TERN. It is fully larger than the common tern of the British shores; has a long, slender, nearly straight, compressed, sharp bill; very long, narrow, and pointed wings, and a long deeply forked tail: the general color is glossy black on the upper parts, except the forehead and the edges of the wings, which, with the under parts, are white. It abounds in the West Indian seas, and is to be seen in myriads on and near some of the *keys* or low barren islets where it breeds. When visitors land on these keys, the disturbed birds rise and fly about in clouds which darken the air, whilst their turmoil overpowers even the roar of the breakers. The nest of the egg-bird is merely a little excavation in the sand, and usually contains three eggs, which are fully 2 in. long, of a pale-cream color, sparingly marked with light-brown and purple tints. The eggs are esteemed delicious, and form an object of profitable adventure in the months of Mar., April, and May, to the crews of numerous small vessels, fitted out from Kingston, Havana, and other West Indian ports. Curious customs prevail among the egg-gatherers at the most frequented keys, and common consent has established a kind of code of laws among them. The eggs remain fresh and fit for use only for a short time. Along with the egg-bird, those of the noddy are also gathered, and those of the sandwich tern and other allied species; and the name egg-bird, with some prefix, is sometimes extended in the West Indies to several of the terns.

EGG-PLANT, *Solanum melongena*, an annual usually less than 2 ft. high, with stem partially woody; fruit very much resembling an egg in appearance, and varying in size from that of a hen's egg to that of a swan's egg, in color generally white, yellow, or violet. The fruit is much used as food, not only in the East Indies, of which the plant is a native, but in warm countries generally. The fruit is known by various names—as egg-apple, auberjine, brinjal, etc.

EGG TRADE. English poultry does not supply eggs in sufficient quantity to meet the home demand, on account partly of the large consumption in manufactures. The deficiency is made up by importations, chiefly from France. There are no means of ascertaining the number of eggs produced by English poultry in the course of a year; but the importations are recorded in parliamentary papers. These importations have largely increased within the last few years. In 1844, they amounted to about 67 millions; in 1860, to nearly 160 millions; and in 1871, to 380,668,000, of the value of £1,263,612. Of this enormous amount 281,530,440 came from France. Germany sent us 49,120,160; and even Spain, Portugal, and the Azores, owing to our fleet steamships, are not too far off to supply our markets with fresh eggs. In 1875, above 600,000,000 eggs were imported, value £2,561,433. The imported eggs are seldom equal in quality to those home-produced; they are often packed in damp straw, the odor from which penetrates the shell, and imparts an unpleasant flavor to the egg. There is a certain warmth in new-laid or good eggs, which tends to ferment the damp straw, or other substance in which they are packed, and this fermentation reacts upon the eggs in the way stated. Until the removal of the duty, imported eggs paid 4*d.* per cubic ft. if from British possessions, and 8*d.* if from foreign countries.

EG'HAM, a village in the n.w. of Surrey, on the left bank of the Thames, 18 m. w. of London. In the vicinity is Runnymede, a meadow on the Thames, where king John conferred with his barons before signing the Magna Charta in 1215. Near also is Cooper's hill, rendered famous by Denham and Pope.

E'GINHARD, or EINHARD, the biographer of Charlemagne, was b. towards the end of the reign of Pipin, or the beginning of that of Charlemagne. At an early age, he repaired to the court of the latter monarch, and became a pupil of Alcuin. His talents and acquirements gained him the favor of the emperor, who appointed him his private secretary, and superintendent of public buildings. E. accompanied the Emperor in all his marches and journeys, never separating from him except on one occasion, when he was dispatched by Charlemagne on a mission to pope Leo. On the death of the emperor, he was appointed preceptor to Lothaire, son of Louis le Débonnaire, and for a number of years afterwards appears to have been lay abbot of various monasteries; but ultimately becoming tired of secular life, he retired to the secluded town of Mühlheim. Here he erected a monastery, and changed the name of the place from Mühlheim to Seligenstadt (City of the Blessed). He is said to have now become a monk, but this is scarcely authenticated. E. died 14th Mar., 840, and was buried beside his wife, who died in 836. The two coffins are now shown in the chapel of the castle at Erbach. The counts of Erbach trace their descent from Eginhard. His *Vita Caroli Magni*, completed about the year 820, with respect to plan and execution, as well as language and style, is incontestably the most important historical work of a biographical character that has come down to us from the middle ages. It was frequently used as a school-book, and was therefore copied *ad infinitum*. The best German edition is that of Pertz, in the *Monumenta Germaniæ Historica*. His *Epistolæ*, 62 in number, are also of considerable value in a historical point of view. The French consider the edition of E.'s works by M. Teulet, with a translation, and life of E. (1848), to be the best and most complete. E.'s second work, the *Annales Regum Francorum, Pippini, Caroli Magni, Hludowici Imperatoris*, embraces the period from 741 to 829. According to a pretty legend, E.'s wife, Emma, was a daughter of Charlemagne. A mutual affection had arisen between them, and on one occasion when the lovers were enjoying a nightly interview, a sudden fall of snow covered the spacious court, thus rendering retreat impossible without leading to a discovery. As the traces of female footsteps could not excite suspicion, Emma carried her lover across the court on her shoulders. This scene, it is said, was observed from a window by Charlemagne, who united the affectionate pair in marriage. On this legend Fouqué founded his romance of *Eginhard and Emma*, and Longfellow has made it the subject of a short poem.

EG'LANTINE, a name sometimes given to the sweet brier (*rosa rubiginosa*), but also sometimes to other of the smaller-flowered species of rose.

EGLINTON AND WINTON, ARCHIBALD WILLIAM MONTGOMERIE, Earl of, K.T., twice lord-lieutenant of Ireland, was b. at Palermo, in 1812. He was a well known patron of the turf and field-sports, and his name is particularly associated with a splendid revival of the mediæval tournament, which he gave at Eglinton castle in 1839 (see TOURNAMENT). Lord E., who was at various times lord-lieutenant and sheriff-principal of Ayrshire, lord-rector and dean of the faculty of Glasgow university, etc., died in 1861.

EGMONT is the name of the principal harbor of the Falkland isles, and of an active volcano in New Zealand, besides several other unimportant places.—1. Port E. is on the n. coast of the more westerly of the principal two islands of the group, its seaward

barriers being the islets of Keppel and Saunders. It is in lat. 51° 21′ s., and long. 60° w. The anchorage is good; and the shores afford fresh water, but are almost destitute of wood.—2. Mount E. is on the northerly island of its own group, rising 8,340 ft. above the sea. It is 18 m. s. of New Plymouth, in lat. 39° 15′ s., long. 174° 13′ east.

EGMONT, LAMORAL, Count, PRINCE OF GAVRE, was b. in the castle of La Hamaide, in Hainault, in 1522; and inherited his property and titles from his elder brother Charles. He accompanied Charles V. on his expedition against Algiers in 1541, and followed that monarch afterwards in all his campaigns, but without distinguishing himself greatly. After the accession of Philip to the throne, E. commanded, with great success, the cavalry, in the battle of St. Quentin, 1557, and next year in that of Gravelines; and when Philip finally returned to Spain, he left E. governor of Flanders and Artois. In this position, E. entered into alliance with the party in the Netherlands that were dissatisfied with the Catholic policy of Philip, and from a courtier became all at once a man of the people. His proud, imperious character, however, and his subsequent conduct, have induced many to suppose that, like his bosom-friend, the prince of Orange, he was less actuated in this by high motives than by self-interest, or at least by disappointed ambition. The more common opinion, however, is, that he was a humane and virtuous patriot, who, although indifferent to Protestantism as a religion, was anxious to do justice to all the members of that oppressed faith. When Margaret, duchess of Parma, against the will of the Protestant party, was made regent-general of the Netherlands, E. and the prince of Orange entered the council of state, and held the command of the few Spanish troops. At first he sided with the party who were discontented with the infringement of the liberties of the provinces, and the introduction of the inquisition; but when insurrection broke out, he at last broke with the prince of Orange and the "Beggars' league," as it was called. He seemed to have restored order, and to be maintaining it, when, in April, 1567, the duke of Alba was sent as lieut.-gen. to the Netherlands. The prince of Orange and other chiefs of the insurrection left the country; E. wishing to save his private property, remained, thinking his return to the court had secured his safety. When Alba entered Brussels, 22d Aug., E. went to meet him, and sought to secure his favor by presents. He appeared to have gained his confidence, when suddenly, after a sitting of the council, he and count Hoorn were treacherously seized, and carried to the citadel of Ghent. The states of Brabant sought to withdraw E. from the bloody tribunal, as it was called, instituted by Alba, and E., as a knight of the Golden Fleece, denied its competency. But all in vain. He was called upon to justify himself against 90 counts of accusation; and as he persisted in protesting against the incompetency of the court, and thus left many of the points unanswered, he was held guilty of contumacy, and along with count Hoorn condemned to death. On the following day, June 4, 1568, they were both beheaded in the market-place of Brussels. Although E. hoped for pardon to the last, and intercession was made for him from the highest quarters, he died with the greatest composure. It is related that as he received the fatal stroke, Johanna Lavil, who had been his mistress, fell down dead, and the people, in a paroxysm of sympathy, dipped handkerchiefs in the blood that seemed shed in martyrdom to freedom. E. left 11 legitimate children, of whom 3 were sons. The whole of his property, movable and immovable, was confiscated with the greatest rigor. See *Correspondance de Marguerite d'Autriche, Duchesse de Parma* (Bruss. 1842), and *Correspondance de Philippe II. sur les Affaires des Pays-Bas* (Bruss. 1848–51, 2 vols.). Goethe has made the death of E. the subject of a tragedy.

EGRET, a name often given to various species of heron (q.v.), particularly those which, at least during the breeding season, have the feathers on the lower part of the back lengthened and their barbs loose, so that this part of the plumage is very soft and flowing. Most of the egrets have beautiful white plumage. The distinction between egrets and other herons is not, however, very strongly marked, and the names are often used indiscriminately, although the name E. is never given to the common heron. E. plumes are used for ornamental purposes, particularly the occipital crest and scapulars of the LITTLE E. (*ardea garzetta*); and the name E. (Fr. *aigrette*) has become a common term for a tuft of feathers, although it is said to be derived from the French *aigre*, harsh, on account of the harshness of the voice of the bird. In old English bills of fare, egrets are mentioned as if they were abundant; and not fewer than 1000 "egrittes" are included in the bill of fare of a single great feast, given at the enthronization of George Neville, archbishop of York, in the reign of Edward IV.; but as there is no other evidence that any species of E. was ever otherwise than of very rare occurrence in Britain, great probability seems to attach to the opinion originally advanced by Dr. Fleming, that perhaps the lapwing might be meant, "the most common bird with a crest."

EGYPT, a country in n.e. Africa, extending from the Mediterranean to the first cataract of the Nile, that of Syene, from lat. 24° 6′ to 31° 36′ north. The name is derived from the Greek *Aigyptos*, a word of uncertain derivation, and as old as the age of Homer. In the hieroglyphs and Coptic, it was called *Kemi* or the Black land, from the color of the soil, and by the Hebrews *Musr* or *Mitsraim*, modified by the Assyrians into *Musr*, and by the Persians into *Mudraya*. The country may be described as the bed of the

Nile, the cultivated territory only extending to the limits of the inundation. This river runs from the cataracts of Assouan, in a northerly direction, to Denderah, where there is one great bend to the w.; and a few miles n. of Cairo (lat. 30° 15' n.), the river divides into two main streams, forming the Rosetta and Damietta branches. The other five mouths, which existed in antiquity, have silted up; the alluvial district inclosed by these mouths, and supposed by the ancients to have been gained from the sea, formed the ancient Delta. The basin of the Nile is formed by the ranges of the Arabian hills on the e., and the Libyan on the w. side. The rate of deposit of mud is supposed to be about 6 in. in a century. The eastern chain of mountains rises to about 1000 ft. above the level of the sea. The great physical peculiarity of E. is the absence of rain, the land being only irrigated by the annual overflow of the Nile. The climate is remarkably mild and sound, especially s. of the Delta; and in the desert, from Cairo to Alexandria, the air contains more moisture than to the south. From the middle of Aug. to Dec., w. winds prevail; e. winds from that time till Mar.; after that, unhealthy s. winds or Khamsin till June; and from June till Aug. the n. or Etesian winds. Earthquakes are occasionally felt; and the temperature varies from 84° F. to 32°. The most remarkable phenomenon is, however, the regular increase of the Nile, fed by the fall of the tropical rains, which commence in 11° n. lat., in the spring; and falling first into the White, and then Blue Nile, reach E. in the middle, and the Delta in the end of June. In the middle of July, the red water appears, and the rise may be dated from that time; it attains its maximum at the end of Sept., and begins to decline visibly in the middle of Oct., and subsides to its minimum in April. At the end of Nov. the irrigated land has dried, and is sown, and is covered with green crops, which last till the end of Feb. In Mar. is the harvest. The state of the Nile, in fact, marks the season more accurately than the variation of temperature. E. is by no means remarkably healthy, as, in addition to the visitations of plague and cholera, ophthalmia, diarrhea, dysentery, and boils often prevail, and European, and even Nigritic races cannot be acclimatized.

Geology.—E. is separated from Nubia by a low hilly region about 50 m. broad from n. to s., composed of granitic rocks. The same crystalline rocks extend up the shore of the Red sea to near the opening of the gulf of Suez, stretching inland for fully 30 miles. The scenery in this district is wild and rude, and the course of the Nile is frequently interrupted by cliffs and broken masses of granite, forming magnificent cataracts. The granitic region terminates at Assouan, the ancient Syene. From the rocks here were obtained the materials for the colossal and monolithic monuments of Egypt. The valley of Upper E. is bounded by two ranges of hills running northward—the Arabian range on the right, the Libyan on the left of the river, both alike composed of cretaceous strata, the predominant rock being sandstone. This is a durable and easily worked stone, and was consequently extensively used in the erection of ancient temples. The city of Thebes was built of it. The cretaceous sandstone extends from the granitic rocks forming the first cataract at Assouan for about 85 m. to Esné, where it is covered by a limestone belonging to the upper chalk series. This continues on both sides of the valley for about 130 m., when it is covered by a tertiary nummulite limestone, which forms the further prolongation northward of both ranges of hills. Because of the easy disintegration of these beds, the scenery in the limestone districts is tame and monotonous; frequent table-lands occur, on one of which are built the three pyramids of Gizeh, the material employed being the predominant limestone.

Over a large extent of E., these rocks are covered with moving desert sands, and in the flat lands bordering the Nile, with the alluvium brought down by its waters, and which has formed the delta at its mouth. This alluvium consists of an argillaceous earth or loam, more or less mixed with sand and a quartzose sand, probably derived from the adjacent deserts by violent winds. It is remarkable that this sedimentary deposit has no traces of stratification, and also that within short distances, great varieties are observed in what are apparently synchronous deposits. Mr. Horner's recent examination of the Nile deposits, and the striking conclusions he deduces from his observations, have caused considerable attention to be paid to these deposits lately. See MEMPHIS.

Natural History and Productions.—The fertile valley of the Nile and the desert regions which inclose it, are very different, not only in their botany, but in their zoology. One of the most notable of Egyptian quadrupeds is the hippopotamus, which formerly reached the Delta, but is now to be seen only in the more southern parts of the Nile. The giraffe is occasionally found within the southern borders of Egypt. The jackal and hyena are common; also the ichneumon (q.v.), so much celebrated among the ancients; and the jerboa. The one-humped camel was originally introduced by the Ptolemies for the transit of the Indian trade. The other usual domestic quadrupeds have existed from the most ancient times. Of domestic birds, water-fowl were anciently the most numerous; the gallinaceous poultry now common not being probably of older date than the Persian invasion. Pigeons have always been abundant. The Egyptian vulture (q.v.) is a common and notable bird, as is also the ibis (q.v.), held sacred by the ancient Egyptians, and of which many fables have been related. The ostrich sometimes occurs in the desert. Of reptiles the most famous is the crocodile of the Nile: monitors (q.v.) are also abundant, saurian reptiles of considerable size. Smaller lizards abound. The trionyx, or soft tortoise, is plentiful in the Nile. Serpents are numerous; amongst the

most venomous and dreaded of which are the asp (q.v.), or haje, and the cerastes (q.v.). E. abounds in fish, the most remarkable being the binny (see BARBEL), the *latus* (one of the perch family), the bayad or *silurus*, the *chromis nilotica*, and the *mormyrus oxyrhynchus*. The sacred beetle (*scarabæus sacer*) is one of the most remarkable insects. Locusts are a dreaded pest. E. is still notable also for the abundance of the other creatures mentioned by Moses as its plagues.—Many of the European trees and plants are found in E.; the date-palm, the doom-palm, the sycamore, acacias, tamarisks, etc., are among its more peculiar botanical productions; also the papyrus (*p-apu*), which anciently supplied material for paper, and the lotus (*shnin*) or water-lily of the Nile. The extensive culture of the papyrus has been, in modern times, replaced by that of the sugar-cane, cotton, indigo, and tobacco; and the plant has almost disappeared. Gourds and melons have always abounded. To the wheat and barley of antiquity have been added maize and durra. E. is very deficient in timber trees; the Pharaohs obtained cedar from Lebanon and ebony from Ethiopia. The rocks of E. afforded the stones used in its edifices and sculptures; granite, syenite, basalt (at Assouan), breccia (in the Cosseir Rood), porphyry (from the quarries of Gebel Doshan, opened in the reign of the emperor Claudius), sandstone, and limestone. Alabaster (found at Tel-el-amarna) has been used from the earliest periods to the present day. Emeralds are produced by the mines of Gebel Zabara; salt, natron, and—since 1850—sulphur, are among the other mineral productions of Egypt.

Divisions.—The country was anciently divided into 44 nomes—22 in Upper, and as many in Lower Egypt. Each nome or department had a separate local municipal government of a monarch or lieutenant-governor, *ha*, besides governors of the cities, of the temples, scribes, judges, and other functionaries. Their limits were measured and defined by landmarks. This division, as old as the 4th dynasty, varied in number at different times. Under Sethos I. or Sesostris, there were 36 nomes—10 in the Thebaid, 10 in the Delta, and 16 in Middle Egypt. At the time of the geographer Ptolemy, there were 47—the Antinoites having been added. The country beyond the cataracts to Hierosycaminos was named at the Roman period Dodekaskoinos. In 400 A.D., E. was divided into Augusta Prima and Secunda on the e., and Ægyptiaca on the w., the Heptanomis as far as Oxyrhynchus was named Arabia, then Thebais Proxima as far as Panopolis, and Thebais Supra to Philæ. Under the Arabs, E. has been divided into Masr-el-Bahri or the Delta; the Faioum, El Bostani, or Middle Egypt; and Es Said or Upper Egypt. In addition to E. proper, Nubia, Darfur, and extensive territories on the upper Nile are now subject to the ruler of E., whose dominions thus embrace 1,400,000 sq. miles.

For a description of the most remarkable antiquities of E., see ABOUSAMBUL, ALEXANDRIA, EDFOU, MEMPHIS, THEBES; also NILOMETER, OBELISK, PYRAMID, etc.

The *population* of the country must have been large at the earliest period, as 100,000 men were employed in the construction of the great pyramid alone during the 4th dynasty. It has been placed at 7,000,000 under the Pharaohs, distributed in 1800 towns, which had increased to 2,000 under Amasis, 525 B.C., and upwards of 3,000 under the Ptolemies. In the reign of Nero, it amounted to 7,800,000. The pop. in 1844 was 2,500,000; in 1859, 5,125,000; and in 1879, including Nubia, Darfur, and other dependencies, nearly 17,000,000, of whom 5,200,000 inhabited E. proper. The great bulk of the inhabitants consist of native Mohammedans; the Copts (q.v.) are estimated at 150,000; and the rest are composed of Bedouin Arabs, Negroes, Abyssinians, Turks, Syrians, Greeks, Armenians, Jews, and western Europeans. The original population appears, both from the language and the physical conformation of the mummies, to have been of Asiatic origin, afterwards blended with Ethiopian by subsequent irruptions and conquests; but there appears to have been an aboriginal race at an early period, of copper color, fair proportioned, although with rather thin legs, large feet, rather high cheek-bones, and large lips. According to Herodotus, Diodorus, and Plato, the system of castes prevailed in Egypt. The first of these authors says there were seven castes—of priests, warriors, cowherds, swineherds, innkeepers, interpreters, and pilots. Diodorus makes only five—priests, soldiers, cultivators, shepherds, and artisans; and Plato the same. The evidence of the monuments, however, shows that these were rather conditions of society than castes, as the different orders not only intermarried, but even, as in the case of priests and soldiers, held both employments. As in all bureaucracies, the sons often obtained the same employments as their fathers.

Religion.—The Egyptian religion was a philosophical pantheism, the various attributes of the deity being divided amongst the different gods of the Pantheon. Unlike the Greek, where a god was honored in a separate temple, each Egyptian divinity was accompanied by a *put* or "company" of companion-gods. The principal nomes and cities had each a family group of gods, consisting of a parent deity, a wife and sister, and a son. Thus Ptah or Vulcan, the eponymous and principal god of Memphis, formed a circle with the goddesses Pasht and Bast; and his son Nefer Tum, Amen Ra at Thebes, was allied with Mu, Nit, and Khonsu. These tetrads, or rather triads, for the female principle was dualized, were often accompanied by inferior deities; and personifications of the elements, passions, and senses, and feelings were introduced. The worship of some triads, however, became universal—that of Osiris, Isis, and Horus being found all over E. at the earliest period. The gods, indeed, are stated by the Greeks to have been

divided into three or more orders. The first contained eight gods; the second twelve; the third, an unknown number. The eight gods of the first order were Ptah, Ra, Shu, Seb, Osiris, Set or Typhon, and Horus, according to the Memphite; and Amen, Mentu, Atum, Shu, Seb, Osiris, Set, Horus, and Sebak, according to the Theban version. Great uncertainty prevails about the gods of the second and third order, and still greater difficulty about the genesis and nature of the gods, different doctrines prevailing at different times and places; and the tendency to fuse different gods into one, particularly at a later period: Amen Ra, for example, being identified with Horus; and Horus, Ra, Chnum, Mentu, and Tum being merely considered the sun at different periods of his diurnal course. Very little light is thrown on the esoteric nature of the deities by the monuments, and the classical sources are untrustworthy; but the antagonism of good and evil is shown by the opposition of the solar gods and the great dragon Apap, a type of darkness, and the hostility of Osiris and Set or Typhon. Some of the gods were self-existent, others emanated from a father, and some were born of a mother only, and others were the children of greater gods. Their energies and powers differed, and their types, generally with human bodies, have often the heads of the animals which were their living emblems, instead of the human. A few foreign deities became at the close of the 18th dynasty engrafted into the religious system—as *Bar*, Baal; *Ashtarata*, Ashtaroth; *Anta*, Anaitis; *Ken*, Kiun; *Reshpu*, Reseph; *Set*, Satan. All the gods had human passions and affections, and their mode of action was material; they walked on earth, or sailed through ethereal space on boats. The principal deities are Ptah, the opener, represented as a bow-legged dwarf or fetus; the Phenician Pataikos, the creator of the world, the sun and moon, out of chaos (*ha*) or matter (*Mu*), to whom belong Pasht, "the lioness," and Bast, Bubastis, lion-headed goddesses presiding over fire, and Nefer Tum, his son, a god wearing a lotus on his head. Next in the cosmic order is Khnum—worshiped at Elephantine—the ram-headed god of the liquid element, who also created the matter of which the gods were made; and connected with him are the goddesses Heka the Frog, or primeval formation, Sati, or "sunbeam," and Anuka, alluding to the genesis of the cosmos. The Theban triad comprised Amen Ra, "the hidden" power of the sun, the Jupiter; *Mu*, the "Mother" goddess or "Matter," the Juno; *Nut*, the "Shuttle," the Minerva; and Khonsu, "Force" or Hercules, a lunar type. A subordinate type of Ammon is Khem, "the enshrined," who, as *Harnekht*, or Powerful Horus, unites beginning and end, or cause and effect. The solar worship comprises *Ra*, the Sun, who traversing the *'sha*, or empyreal space of Gates, passes each hour a separate region, and as he descends behind the w. hills of the horizon, becomes Atum, also a demiurge; while as Mentu, a hawk-headed god, he is Mars, and as Khepra, a scarab-headed god, the male creative or existent principle, and is identified with Amen, Khnum, and other deities. Day and night, Ra and his satellites pursue the Apap or "Giant" Darkness with alternate success. The souls of the blessed come off from earth, and entering the boat of Ra, there enjoy the perpetual streams of light which emanate from his orb. From *Ra* or Helios spring Shu and Tef the Gemini, Athor and Ma. *Seb* or "Time," and *Nu* or the "Firmament," gave birth to Osiris, Isis, Nephthys, Set, and the elder Horus, a group of terrestrial and infernal deities. The myth of Osiris destroyed by his brother Set, hewn in pieces, recovered by Isis, and avenged by Horus his son, embalmed by Anubis and the genii of the dead, and defended by Thoth, the Egyptian Logos, at the "great judgment" before his accusers, Set and the conspirators, was the type of the judgment and future destiny of man, and all deceased were called by his name. See OSIRIS. Numerous inferior deities, such as Hapi, the Nile, appear either as other forms of the superior deities or local varieties of the myths. Each deity had its sacred animal, which received a local worship, and which was considered to be the "second life" of the deity it represented. The special animal selected was installed in the adytum of the temple, and gave oracular responses. The most remarkable of these animals was the Apis bull of Memphis, whose worship had a national extension. The Egyptians believed in the transmigration of souls, and all not sufficiently pure to be admitted into the courts of the sun, or whose bodies had perished before the expiration of 3,000 years, passed from body to body (see EMBALMING), having first descended to the Hades, and passed through the appointed trials and regions, endeavoring to reach the manifestation to light. In this progress, the soul was required to know and tell the names of the doors, regions, and their guardian demons through which it had to pass.

Chronology and History.—One of the most important points of Egyptian history is the chronological, involving as it does the date of the earliest historical epoch of man. In the time of Ptolemy Philadelphus, in the 3d c. B.C., Manetho of Sebennytus, high-priest of Heliopolis, drew up, at the request of the king, a history, in which he divided the space of time from Menes to the reconquest of E. by Darius II. into 30 dynasties. The work of Manetho has perished, but chronological epitomes remain in the works of Julius Africanus, a writer of 300 A.D., and Eusebius, and George the Syncellus, 800 A.D. Besides the Bible, Herodotus, Diodorus, Josephus, and other writers, especially Eratosthenes, also contained sources of chronological information, and the learned of Europe for the last 3 centuries had endeavored to reconcile the conflicting statements of these authors, the discrepancy of their ciphers, and the inaccuracy of their details. Even in Biblical chronology, the Hebrew, Samaritan, and Septuagint versions gave very different results; but in England the chronology of Usher, which, from the Hebrew, placed 4004

B.C. as the date of creation, and 2348 B.C. for the deluge, has somehow obtained the sanction of theological writers. To reconcile these conflicting authorities, two schools of chronological critics, called of the long and short chronology, have arisen, and the epoch of Menes has been placed by the advocates of the long chronology, as Boöckh, at 5702 B.C., by Bunsen, at 3643 B.C., by Lepsius, at 3892 B.C., by Henry, at 5305 B.C.; while the same date falls, according to Sharpe, 2000 B.C., to Nolan, 2673 B.C., and Poole, 2717 B.C. Unfortunately, the monumental information is defective at certain periods, while in all, the national custom of dating in kings' reigns only, without the use of the controlling date of any cycle, renders the subject still more obscure; for the sothic cycle, or dogstar period of 1461 vague years, was not in official use. The celebrated hieratic papyrus at Turin, of the age of the 19th dynasty, which contained a system of chronology arranged on a principle of cyclic and regnal years, has unfortunately suffered so much mutilation that it is impossible to reconstruct it satisfactorily. It is therefore better to arrange the history according to the dynastic successions of Manetho, giving these as waves of time, leaving the question of their duration to individual judgment. At present, the elaborate systems of chronology are only chronological draughts from recollection of a vast ruin, each more or less happy or defective in some particular respects or general conception. There are not sufficient monumental data for a sure conclusion about the remoter dynasties. Mythically E. was said to have been first governed by a dynasty of gods, who, according to Manetho and other Greek authors, were Vulcan or Ptah, Helios the Sun or Ra, Sôs or Shu, Saturn or Seb, Osiris or Heshar, Typhon or Seti, and Horus or Hor. These gods reigned 13,900 years, and were succeeded by the Manes and demigods, whose reign occupied 4,000 more years. But considerable difference exists in the lists—that of Thebes giving Amen, Mentu, Tum, Su and Seb, Osiris, Seti, and Horus; that of Memphis, Ptah, Ra, Shu, Seb, Osiris, Set, and Horus. After the reigns of the gods, the epoch of Menes is the first point in the chronology of the history of ancient E., and has been placed, as above mentioned, by the rival systems of chronology.

No contemporary monuments of Menes exist, but he is said by tradition to have corrupted the simplicity of the patriarchal life of the nation, instituted the first laws and divine worship, founded the temple of Ptah, by turning the course of the Nile, by means of a barrage, to the w. at Kosheishe, and to have founded Mennefer or Memphis, after some expeditions against the Libyans, and to have been devoured by a crocodile. The statue of Menes is represented borne in ancestral procession in the reigns of Rameses II. and III. at Thebes, but no contemporary monument of this monarch exists. His successor, Athothis, wrote a work upon anatomy, and built the palace of Memphis. The other kings of this dynasty were Kenkenes, Venephes, who built the pyramids at Ko or Kochome, Miebis, Semempses, and Bieneches; but their names have not been identified, nor do any monuments of them remain. This dynasty reigned about 250 years, and was succeeded by the 2d, which lasted about 300 years, but of which no contemporary monuments remain. This dynasty, however, introduced the worship of sacred animals, and abolished the Salic law, which had hitherto prevailed. With the 3d dynasty of Memphites, which endured about 200 years, monumental history properly begins, the monumental king Seneferu of this dynasty having conquered the Sinaitic peninsula, and opened the copper mines of the Wady Magara. The 4th dynasty, also of Memphites, had an existence of 284 years. The celebrated canon of Turin contains fragments of the duration of the reigns and lives of the monarchs of this line, some of which were prolonged to upwards of 90 years. Monumental remains are found of Soris. The two Khufus built the two great pyramids of Gizeh, and held the Arabian peninsula in subjection. Cheops, or the elder of the two Khufus, constructed the largest of this group of the pyramids by means of a forced conscription, and was regarded as a detestable and impious tyrant. Subsequently, he repented, and wrote a book in honor of the gods, which enjoyed a great reputation. Khafren, his successor, built the second of the great pyramids, and Mencheres, or Mycerinus, the third pyramid. The so-called book of the ritual, which dates from this period, and the high civilization which Memphis had then attained, mark an epoch in Egyptian civilization, and the numerous tombs, in the vicinity of the pyramid, constructed during this and the subsequent dynasty, exhibit a highly progressing state of civilization; the cultivation of farms, the chase, the arts, enjoyed a great deal of the attention of the Egyptians; but horses and wheel-carriages were alike unknown, although the simpler mechanical instruments and manufactured articles had been invented.

The 4th dynasty began, according to Lepsius, 3427 B.C. The 5th, which monumentally appears a continuation of the 4th, terminates with Annos or Onnos, who was killed by his guards. His sepulchre was the pyramid of the Mastabat-el-Faraoun, near Saqqarah. This 5th dynasty was, however, from Elephantine, and appears to have ruled in Upper as well as Lower E., monuments of it being found in the Thebaid. Considerable difference, however, exists between Lepsius and Bunsen in the assignment of the royal cartouches of this period, Lepsius assigning them to the 5th, and Bunsen to the 3d dynasty. The group of the Abooseer pyramids is of this age. The next dynasty, the 6th, a Memphite, was more remarkable, and tombs and numerous small objects of the period are found in Upper and Central Egypt, and in the valley of Hamamat, leading from Coptos to the Red sea. The principal monarchs of this line were Othoes,

killed by his guards; Phiops or Apappus, whose reign extended to 100 years; and Nitocris, whom the legends represent as drowning the murderers of her brother, and constructing the third Gizeh pyramid, in which she was buried, and which she perhaps enlarged from the old original sepulcher of Mycerinus, having added to it the revetment of red syenitic granite. Of the 7th dynasty, two names, An and Assa, are supposed to have been found; but the monumental connection between the close of the 6th and 11th dynasties, has not been even conjecturally restored, from the conflicting tablets of Karnak and Abydos, and the mutilated papyrus of Turin. It is not possible to follow the order of the succession till the 11th dynasty, nor are there monuments either of a public or sepulchral nature to show the existence of the intermediate period, rendered more unintelligible by the contemptuous silence of the lists of Manetho, one tyrant, Achthoes, being alone mentioned in them. Considerable discrepancy exists between the canon of Turin and the lists of Manetho relative to this period; the canon making two dynasties—one of 6, the other of 17 kings between the 6th and the 12th dynasty; Manetho, 86 kings, and about 500 years. The impossibility of reconciling these statements has given rise to the idea, that the lists were respectively Memphite and Theban, each having contemporary kings. The existence, however, of the 11th dynasty, consisting of a line of monarchs called Hantefs and Mentuhetps, has been proved by the discoveries of their coffins in the tombs at Gournah and the El Assasifs, and the tablets of the island of Konosso and others, referring to the construction of the fortress of Coptos and in honor of the local god. The successive reigns and monarchs of the 12th dynasty are fixed by numerous monuments. Amenemha I., the founder of the line, opened the quarries of Tourah, embellished An or Heliopolis, and founded the temple of Amen at Thebes, reigning nine years alone, and seven with Osirtesen I., his successor. A historical papyrus recording his dreams and other facts of this reign remains. The monuments of Osirtesen I. exist in the Faioum at Benihassan and Heliopolis; he subjected some of the Ethiopian tribes. During his reign there occurred a famine; and in the 38th year of his reign, he associated Amenemha II. into the government for four years. Little of historical import is known of his successors, Amenemha II. and Osirtesen II., except their conquest of Kash or Ethiopia, and the arrival of a tribe of 36 Amu or Semities in the sixth year of Osirtesen II. These resemble, in their costume and physiognomy, the Hebrews, and have been supposed to represent the arrival of Jacob in Egypt. Osirtesen III., his successor, established the southern frontier at Samneh, which he fortified; and was subsequently deified in Nubia, and received, in the reign of Thothmes III., a worship in that region, and fortified Coptos. His successor, Amenemha III., excavated the Birket-el-Keroun or Mœris lake; constructed the Labyrinth, composed of 6,000 rooms; the pyramid of Crocodilopolis, in its vicinity; and the temple of the goddess Athor at the Sarabout-el-Khadem. His successors, Amenemha IV. and the queen Sebeknefru, are only known from the remains of the Labyrinth, and some inferior monuments. The same difficulty of tracing the succession which exists between the 6th and 12th, occurs again between the 12th and 15th. The most plausible conjecture, however, is that the 13th (Diospolite) and the 14th Xoite dynasty, in Lower E., were contemporaneous, and that the 15th and 16th Theban and Diospolitan had for their contemporaries the 17th Hykshos or Shepherd dynasty in Lower Egypt. The monarchs of the 14th dynasty appear from the monuments to have been occupied in regulating the course of the Nile at Samneh, while their power reached from the isle of Argo to El Hamamat, and they engaged in traffic with the Phenicians. About 2000 B.C., the advance of the Assyrians in Asia, or some internal revolution, precipitated the so-called Hykshos or Shepherd kings, who appear to have been Arabs or Phenicians, on Lower Egypt. These invaders overthrew the Xoite dynasty of Lower E., took Memphis by assault, and established themselves in the city of Haouar or Avaris, subsequently called Tanis, where their monuments still exist. But the Egyptian rulers of Upper E. overthrew their rule, and under Ra-skenen, the last king of the 16th dynasty, Avaris was invested, while his successor, Aahmes I., of the 17th, took it by assault, besieged Sarahan or Sharon, and attacked the mountaineers of Nubia. The Hykshos endeavored to substitute the worship of Sut or Set for Ra or the Sun, but Aahmes I. restored the ancient temples, and opened the quarries of Tourah. Amenophis I., his son and successor, who reigned under the tutelage of his mother, continued the Ethiopian campaigns, and embellished Thebes. Thothmes I. carried his arms to Tombos, in the heart of Nubia, and into Naharaina or Mesopotamia, and embellished Thebes. Thothmes II., who reigned under the guardianship of Hatasu, defeated the Shos. His brother and successor, Thothmes III., elevated E. to the highest pinnacle of glory; and by the victory of Megiddo, in his 23d year, subjected the whole of Syria and part of Mesopotamia to his arms, receiving immense tributes from Kash and the Ethiopian races of the S., the islands of the sea, and Assyria, Babylon, Phœnicia, and Central Asia, and endowing the temple of Thebes with the revenues of tributary cities. A calendar preserved at Elephantine recording the heliacal rise of the Dog-star on the 28th Epiphi, shows that the year 1444 B.C. fell in his reign. Thothmes III. recovered the copper-mines of Magarah, and decorated all Egypt. Amenophis II. continued the conquests of the Ruten, took Nineveh by assault, and vanquished the Ethiopians. Thothmes IV. is supposed to have erected the Great Sphinx. Amenophis III. maintained the frontiers of the empire. At this period, a

heresy became introduced into E., favored by the queen Taia. Amenophis IV. became a worshiper of the Aten or solar orb, to the exclusion of the other deities of E., especially of Amen Ra. The capital was removed to Tel-el-Amarna or Alabastron; the king changed his name to Akhuenatnen, and a succession of three heretic monarchs ruled E. for about 33 years, till Haremhebi or Horus restored the orthodox faith and the limits of empire.

The link which connects the last monarchs of the 18th to the monarchs of the 19th dynasty has been lost; but Horus was succeeded by Rameses I.—the first of a long line of monarchs—who appears to have formed a treaty with the Khita or Hittites, and to have advanced the conquests of E. to the Wady Halfa. He was succeeded by Seti I. or Sethos, who attacked the Remenu or Armenians, the Rutennu, and the Shasu or Shepherds, who had again advanced to the Pa-khetem or Pithoum, on the confines of Egypt. Naharaina or Mesopotamia, and Sharu or Syria, Pânt or Phœnicia, had also been invaded by his arms. The city of Atsh or Katsh, the supposed Cadytis, was also besieged by Sethos, whose Asiatic victories introduced into E. the worship of Baal and Ashtaroth. Tyre, Avathus, and Bethanath in Canaan, were garrisoned by his forces. E. was also embellished with many noble monuments in his reign. He was buried in a deep, excavated rock-tomb in the Biban-el-Molook—the kings of the 18th and 19th dynasties having substituted long, excavated tunnels or syringes, in the mountains of the Arabian chain of Western Thebes, for the ostentatious pyramids in use from the 4th to the 12th dynasty, which attracted the cupidity of the invaders of Egypt. Rameses II., the son of Seti I., seems to have succeeded him at the very youthful age of seven. In his fifth year, he defeated the Khita and their Syrian confederates at the battle of Katsh, in which many of the princes and officers of the Khita were drowned in the river Arunata, or Orontes. The battle endured two days, and the panegyric of an Egyptian scribe, Pentaur, has invested Rameses with the power of a god. The war lasted till his ninth year, and the king took Shaluma or Salem, the ancient site of Jerusalem, and other cities. In his twenty-first year, a treaty of peace and extradition was established between the two countries, and Rameses married a princess of this nation. It is the tablet of this monarch which is found at the Nahr-el-Kelb, or Passes of the Lycus, near Beyrout. This monarch subjected Ethiopia, which had revolted, to his arms, reimposed the tribute, and placed the country again under the government of the princes of Ethiopia, or Egyptian viceroys. He also established a fleet on the Mediterranean. His name and reputation formed the basis of the legendary Sesostris; the exploits of the monarchs of the 18th dynasty, and probably of his successors, being united with his fame. The reign of Rameses, although it exhibits a decline of art, yet demonstrates E. to have been in the height of its glory; and his epoch appears to have been about 1322 B.C., a special calendar having been sculptured to record the coincidence of the heliacal rising of the Dog-star and 1st Thoth, or commencement of the fixed and canicular year. His place of burial is uncertain—perhaps in the vaults of the Ramesseum. His thirteenth son, Merienptah or Menephthes, succeeded him upon the throne, transferred the capital to Memphis, successfully contended with the Tamahu or Libyans and the Rabu, and appears to be the Amenophis of Manetho, and the Pharaoh of the Exodus. He introduced the heretical worship of Sut, Seth, or Typhon, and was succeeded by Sethos II., Amenmes, Sipthah, Tausri, and Setinekht, whose inglorious reigns close the 19th dynasty. The connection of Rameses III. with the previous dynasty is obscure. This monarch was chiefly at war with the Philistines, and the other maritime tribes of Greece and Asia Minor, and gained naval victories in the Mediterranean, and repeated the conquest of Ethiopia. He was followed by the splendid but inglorious line of the Ramessids, the sixth of whom gained victories in Ethiopia; and the twelfth of whom, having married a princess of the land of Bakhten, sent the ark of the god Khous to Bakhten, at the request of the monarch of that country, for the cure of the queen's sister. The fall of this dynasty appears to have been owing to internal revolution, as their Tanite successors held the office of high-priests of Amen Ra at Thebes. They held the government for 130 years, and entertained foreign relations, one of the monarchs having married a princess of the Rutennu. The 22d dynasty, the monumental, is rather confused. They were also high-priests of Amen Ra. Shashank I. is the biblical Shishak. His invasion of Israel, with 12,000 chariots and 60,000 cavalry, and the capture of Jerusalem, is recorded on the portico of the Bubastites at Karnak. The other monarchs of this line, Osorkon I., Takelot I., and their successors, have left no remarkable records; and the dynasty, which appears of foreign origin, is more chronologically than historically important, the taking of Jerusalem falling between 989 and 959 B.C. The 23d Tanite dynasty, which succeeded it, exhibits a decadence in E., and was succeeded by the 24th dynasty, of a single monarch, the celebrated Bekenrenf or Bocchoris, who reformed the laws; but having been taken prisoner by the Ethiopian Sabaco, of the 25th dynasty, was burned alive. From this period, the history of E. becomes involved with that of Judea and Greece. Tirhaka came to the assistance of Hezekiah against Sennacherib, and built the temple of Gebel Barkal. According to this Assyrian cuneiform inscription, the Ethiopians were expelled by the Assyrians, and the country placed under various monarchs. This state of affairs was closed by the rise of Psammitichus I. of the 26th dynasty, who, by the aid of Greek mercenaries, overthrew the other petty princes. His age marks a revival in art, and restoration of the old constitution of the

empire. His successor, Nekao or Nechos II., planned the canal across the isthmus of Suez, from which he desisted, warned by the advice of an oracle, after having lost 120,000 men in the attempt. Under his reign, the Phœnician navigators first passed the line. After defeating Josiah, king of Judah, and conquering Palestine, he was himself defeated by Nebuchadnezzar at Karkemish. Psammitichus II. carried his arms into Ethiopia. Apries, his successor, having lost all the conquests, was deposed by Amasis, his successor, and strangled. Amasis favored in different ways the Greek colonies in E., and married a Cyrenean wife, and conquered Cyprus, but incurred the enmity of Cambyses, who overthrew his son and successor at the battle of Pelusium (526–527 B.C.). Cambyses treated E. with considerable moderation, but after an unsuccessful expedition against the Ethiopians, lost his reason, stabbed the bull Apis, and committed various atrocities. His successor, Darius I., governed E. with more prudence; but Xerxes I. and Artaxerxes I. had successively to reduce it to subjection, which they did in spite of assistance rendered to it by the Athenians. The 27th dynasty of Persians was followed by the Saite line, the 28th, Amyrtæus and Pausiris, who still held ground against the Persians; the 29th, Mendesian dynasty of Nepherches and Achoreus, maintained a Greek alliance; and the 30th, Sebennytic, consisted of Nectanebes I., who successfully resisted Pharnabazus and the Iphicrates; of Teos, who employed Agesilaus; and Nectanebes II., who fled into Ethiopia before the Persians (340 B.C.).

From this time, E. remained a province of Persia till its conquest by Alexander the great, who founded Alexandria. Subsequently, E. passed under the Greek rule, and the language of the government, and the administration and philosophy, became essentially Greek. The court of the Ptolemies became the center of learning and philosophy; and Ptolemy Philadelphus, successful in his external wars, built the museum, founded the library of Alexandria, purchased the most valuable of manuscripts, engaged the most celebrated professors, and had the Septuagint translation made of the Hebrew Scriptures, and the Egyptian history of Manetho drawn up. His successor, Euergetes, pushed the southern limits of his empire to Axum. Philopator (221–204 B.C.) warred with Antiochus, persecuted the Jews, and encouraged learning. Epiphanes (204–180 B.C.) encountered repeated rebellions, and was succeeded by Philometor (180–145 B.C.) and Euergetes II. (145–116 B.C.), by Soter II. and Cleopatra till 106 B.C., and by Alexander (87 B.C.), under whom Thebes rebelled; then by Cleopatra Berenice, Alexander II. (80 B.C.), and Neos Dionysus (51 B.C.), and finally by the celebrated Cleopatra; and after the battle of Actium (30 B.C.), E. passed into the condition of a province of Rome, governed always by a Roman governor of the equestrian, not senatorial rank.

The most important events in E. under the Roman rule were—the introduction of the Julian year by Augustus (24 B.C.), the visit of Vespasian to Alexandria (70 A.D.), and that of Hadrian (122 A.D.), the development of the Gnostic heresy, the visit of Caracalla (211 A.D.), the conquest of E. by Zenobia (270 A.D.), the revolt of Firmus (272 A.D.), the persecution of Diocletian (304 A.D.), and the rise of Manicheism, the great Arian controversy in the reign of Constantine, the rise of asceticism, magic, and astrology, and the final destruction of paganism (379 A.D.).

At the division of the empire (395 A.D.), E. fell to the Eastern empire, and, at its fall, had become one of the great patriarchates of the Christian church; but owing to the religious feuds of the Jacobites and Melchites, it became a province of Persia (616 A.D.) for 12 years. The Coptic governor Makaukas, who reigned in the name of Heraclius, endeavored to make himself independent, and invited the arms of the Arabs, and Omar I. easily conquered E., in the nineteenth year of the hegira (640 A.D.).

History since the Mohammedan Conquest.—Although Alexandria was retaken by Constantine III., the Arabs drove him out, and E. remained an appanage of the caliphat. It afterwards passed into the dynasty of the Thonlounides (868 A.D.): a new dynasty, the Akshidide, succeeded in 935 A.D., to give way to the Fatimide in 969 A.D., under which Cairo was built, and E. regained some of its prosperity, although in 1118 A.D. Baldwin I. burned the maritime town of Faramah. Subsequently it passed under the Ayoubites, and Saladin, who fortified Cairo, built the citadel, excavated the well, and erected the granaries of Jusuf. In 1218 A.D., the crusaders took Damietta, but were subsequently driven back in 1221 A.D. One of the later princes, Saleh-Nedjim Eddin, built the castle of Rhodah, and created the order of Mamelukes; but Louis IX. of France (1248 A.D.) took Damietta and gained the battle of Mansourah. In 1254, the Ayoubites entirely fell, and E. became subject to the Baharite and Bordjite Mamelukes, under whose government it flourished, and even pushed its conquests to Cyprus and Asia Minor, till, in 1517, Touman Bey fell into the power of Selim I., and E. became a province of the Turks, and administered by pashas. In 1601, the use of tobacco was introduced. Constant rebellions of the Mamelukes, and the violence of contending factions, distracted the country. The most remarkable event of this period was the French invasion by Bonaparte in 1798, which, by the conquest of Alexandria, and the battle of the Pyramids against the Mamelukes, led to the entire subjection of the country, from which the French were finally expelled by the Turks and British in 1801, and the country restored to the Ottoman Porte. The rise of Mohammed Ali in 1806 imparted a galvanic prosperity to E., by the destruction of the Mamelukes, the formation of a regular army, the increase of security, the improvement of the irrigation, and the introduction of European civilization. In 1816, Mohammed Ali rendered part of Arabia

tributary by means of his son-in-law, Ibrahim; and afterwards wrested Syria from the Porte, and held it as tributary by the treaty of Kutahia in 1835. The victory of Nisib, in 1839, would have elevated him to the throne of Constantinople; but the quadruple alliance in 1840, the fall of St. Jean d'Arc to the British, and the evacuation of Syria, compelled him to limit his power to the pashalik of Egypt. Ismail Pasha reduced Nubia to a dependency of Egypt in 1820. In 1849, Mohammed Ali died, and was succeeded by Abbas Pasha, his grandson, replaced in turn by Said Pasha in 1854. M. de Lesseps now obtained the previously withheld co-operation of the Egyptian government in his scheme of the Suez canal (opened in 1869). Said was succeeded in 1863 by his nephew, Ismail, who, by leave of the sultan, took in 1866 the hereditary title of khedive (q.v.). The same firman made the succession to the throne of Egypt direct from father to son, instead of descending, according to Turkish law, to the eldest heir; and in 1873 the sultan granted to the khedive the right (withdrawn in 1879) of concluding treaties and that of maintaining an army. Darfur was annexed to E. in 1874, and in that and the following year further conquests were made in the south. Through sir Samuel Baker and Gordon Pasha, governor of the Soudan, the khedive has done much to suppress the slave-trade in his dominions. In 1875, the khedive sold to Great Britain 177,000 shares in the Suez canal (q.v.) for £4,000,000. The condition of the Egyptian finances was almost hopelessly involved, when in 1876 the revenue was put under the management of European commissioners. An Egyptian contingent of about 10,000 men, under the command of Prince Hassan, third son of Ismail Pasha, fought for the crescent in the Russo-Turkish war of 1877–78. The new financial system having proved unsuccessful, another commission of inquiry was appointed; and ere long it was announced that the khedive had absolutely accepted the European system of constitutional government, and had made Nubar Pasha head of a reformed administration. The summary dismissal of this ministry in April, 1879, was followed by the interference of the European governments. The khedive, who declined voluntarily to abdicate, was, at the instance of the western powers, deposed by his suzerain the sultan in June, and prince Tewfik, Ismail's eldest son, was proclaimed viceroy of Egypt.

Statistics.—The revenue is about £10,000,000, and rarely suffices to cover the expenditure, which includes an annual tribute of £700,000 to the Porte. The national debt is over £80,000,000; besides, the Khedive's personal debt amounted in 1878 to £8,815,000. In 1877, the total imports of E. had a value of £4,506,000, the exports (chiefly cotton) of £15,500,000. After the Russo-Turkish war, the army of E. was reduced to 15,000. The navy includes two frigates, two corvettes, yachts, and gunboats.

Ancient Civilization.—It now remains to consider the old civilization of the Egyptians, which had made such strides at an early period of their history. In the sciences, as early as the 4th dynasty, the notation of time, the decimal system of numbers, weights, and measures adjusted to a pound of 1400 grains, the geographical division of the country, and the division of the year (of 365 days) into three periods (of four months of 30 days) and twelve months, were already known, while the form of the buildings implies a knowledge of geometry and its sister sciences. An empirical knowledge of astronomy was probably possessed; nor could the arts have reached such a high development without some acquaintance with chemistry; and tradition assigns a knowledge of medicine and anatomy to a still earlier age. The art of literary composition also existed in the 11th dynasty, the fragments of the religious or so-called hermetic books of that age have reached us (see PAPYRUS); and Cheops himself was an author of renown. The language of the period, although concise and obscure, was nevertheless fixed; and a code of manners and morals, under the 6th dynasty, has been handed down. Architecture had attained great refinement at an early period; not only were the chambers and temples, and other edifices, squared and directed to face the cardinal points, but the use of a kind of false arch, or stones disposed so as to form an angle overhead to relieve superincumbent pressure, *en décharge*, was practiced as early as the 4th, and the vault or arch was in existence in the 11th and 18th dynasties, eight centuries before that of the Cloaca Maxima of Rome. Columns were in use as early as the 4th dynasty; and in the 12th, the so-called proto-Doric ones of Benihassan, with their cornices and triglyphs, show that the Greeks derived this order of architecture from Egypt. The symmetric arrangement of the temples, consisting of rectangular court-yards and hypæthral halls of many columns, built before the original shrine, with their gateways, slightly converging to the apex, and their bold and severe lines, and the obelisk (see OBELISK), and the pyramid (see PYRAMID), forms admirably adapted to resist the inroad of time, not to mention the remarkably fine masonry, prove the high development this art had acquired at the remotest age. Nor was sculpture less advanced, for long before Dædalus, the statues of the 4th dynasty, at least 2000 B.C., had been molded with great accuracy to a fixed canon; and although their architectural employment had rendered their action rectilinear—such as the arms pendant, the left foot advanced, and the feet not detached but when in stone, with the part between them reserved—and the ears were placed too high in the head, and a kind of pillar was fixed behind in standing figures, yet in portraiture they had attained to great perfection. Sculpture, indeed, in the human form was always restricted to a few conventional attitudes; but some of the lions and sphinxes are executed with a spirit surpassing the power of Greek artists. A peculiar kind of bas-relief prevailed in E., the figures being sunk below the surface like the intaglio fig-

ures of a gem, but in slightly convex relief, not concave. This style, called cavo-rilievo, or intaglio, has been most successful in preserving the hieroglyphs and anaglyphs of the monuments. Bronze statues cast from molds, and having a leaden or other core, were first made in E., and subsequently introduced into Greece by Rhœcus. This art flourished best under the earlier dynasties, and had much degenerated in the 19th and 20th, although subsequently revived by the 26th. Painting appeared at the same age chiefly in tempera or whitewashed surfaces, although fresco was occasionally used, and encaustic appears only under the Greeks and Romans. This art, of course, was freer than sculpture, but yet had a rigid architectural character, and followed the same canon as sculpture, the colors used being generally the pure or primitive, and the background uniformly white. The architectural details of Egyptian temples and the hieroglyphs appear to have been always colored, and added additional charm to the sculptures. The religious papyri or rituals were also often embellished with elaborately colored vignettes, resembling the illuminations of modern manuscripts. Nor had the Egyptians attained less eminence in the art of music, the harp and flute appearing in use as early as the 4th, and heptachord and pentachord lyres as early as the 12th dynasty; besides which, drums, tambourines, flutes, cymbals, trumpets, and guitars, are seen in the 18th, and the national instrument, the jingling sistrum, in the 4th. Many of the instruments are of great size, and must have produced considerable effect. Nor was the art of song wanting, and measured recitations or songs occur on monuments of the 12th dynasty, while the lays of Maneros traditionally dated to a still earlier period. Poetry, indeed, was at all times in use, and the antithetic genius of the language suggested the application of the strophe and antistrophe (see HIEROGLYPHICS), although it is not possible to define the meter. In the mechanical arts, many inventions had been made: the blow-pipe, used as a bellows, appears in the 5th dynasty; bellows and siphons in the 18th. The saw, the adze, the chisel, press, balance, and lever appear in the 5th, the harpoon in the 12th, razors in the 12th, the plough and other agricultural implements in the 5th. Glass of an opaque kind is seen in the 4th, and dated specimens in the reign of Thothmes III. (1445 B.C.), give the priority to E. (see GLASS); the oldest transparent glass, the Assyrian, not dating older than Sargina (711 B.C.). A glazed pottery or porcelain (see POTTERY), the potter's wheel, and the kiln, appear in the 4th; and the art of metallurgy, with the use of tin, at the same period. In the military art, the Egyptians used at an early age defensive armor of shields, cuirasses of quilted leather, and helmets; while spears, clubs, maces, swords, daggers, bows, and hatchets formed their offensive weapons. For sieges, they employed the testudo, ladders, torches and lanterns, and mines. The army was composed of infantry till the beginning of the 18th dynasty, when war-chariots were introduced; for, prior to that period, the ass only was known and used for transport; and carriages not having been invented, persons and goods were transported, on the panniers of asses, or on a kind of saddle slung between two of these useful animals. War-boats no doubt existed at an early period, and are mentioned as early as the 12th dynasty; but sea-going vessels not till the 18th, and no fleet till the 19th. The Nile, however, was constantly navigated by row-galleys with sails. An extensive commerce was carried on with neighboring nations, and their tribute enriched the country with slaves, cattle, gems, valuable metals, and objects of curiosity. Rare animals were collected for ostentation. Under the earlier dynasties, the chief occupation of the nation appears to have been rearing cattle, cultivating grain, indulging in banquets, fishing, fowling, and the chase, and the establishment of each noble contained in itself all the organization and artificers necessary for its maintenance. How transactions were carried on without the use of money, is not very clear, unless gold circulated molded in the shape of rings adjusted to a given weight, but coin plate is mentioned by its pounds, *mna*, and its ounces, *kat*. The Persians first introduced money. See NUMISMATICS. The wealth of families was, however, spent on the tombs and furniture of the dead, and the preparations for embalming, which were on so vast a scale that filial piety did not disdain to mortgage not only the sepulchers, but the very mummies of its ancestors. See EMBALMING. Amusements were various, from the single-stick and juggling, the dance of almehs, the bull-fight, to draughts, dice, and morris. In fact, ancient Egypt had a material civilization, which exerted all the requirements of industry, and forgot none of idleness. Pleasure was the object of existence, not, however, untempered by the voice of reason or the appeals of conscience, the moral code of duties being as pure as that of contemporary nations.

The civil government was administered by the three upper castes. The priests, distinguished by their superior knowledge, cleanliness, and godliness, had the ecclesiastical; the temples being administered by high priests and an inferior hierarchy, with overseers, and governors of revenues, domains, and donatives. Each temple, like a monastic institution, had its carefully subdivided organization, each denizen having a separate charge or jurisdiction. The political and civil government was administered by royal scribes, or secretaries of state, who attended to the revenue, justice, foreign affairs, and all the interests of the executive. Sacred scribes attended to the ecclesiastic interests, and inferior scribes to the local interests. The public works, the collection of grain, and of the linen dues; the cattle, workmen, wells, irriga-

tion, had each their separate superintendents and scribes. The military force of 410,000 men, at a later period, comprising all arms of the service, was ruled with severe discipline, and under the direction of nomarchs (*ka*), colonels (*hrai*), captains (*mer*), and lieutenants (*atnu*). The criminal and civil law was administered by judges (*satem en ash*), who held traveling assizes, and to whose tribunals the necessary officers were attached. The athlophoros or standard-bearer also transmitted the decrees of the royal chancery. The execution of deeds required so many witnesses that fraud evidently often occurred. The superior position of women in the social scale, notwithstanding the permission to marry within degrees of consanguinity usually forbidden, shows that the Egyptians reached a higher point of delicacy and refinement than either their western or eastern contemporaries. Colossal in its art, profound in its philosophy and religion, and in possession of the knowledge of the arts and sciences, E. exhibits the astonishing phenomenon of an unexpectedly high and ancient civilization. See Bunsen, *Aegyptens-Stelle* (1845–57); Lepsius, *Denkmäler* (1849–74) and other works; Rosellini, *Monumenti dell' Egitto e della Nubia* (1840); Sharpe, *History of Egypt* (1846); Brugsch, *Histoire d'Egypte* (1849; new ed. 1875); Wilkinson, *Manners and Customs of the Egyptians* (1847; new ed. by Birch, 1879); Lane, *Modern Egyptians* (1842); Chabas, *Mélanges Egyptologiques*, (1862–70); M'Coan, *E. as it is* (1877); Jerrold, *Egypt under Ismail Pasha* (1879).

EGYPTIAN ARCHITECTURE. There is no reason to question the originality of Egyptian architecture, and the structures of Egypt are probably the oldest specimens known in the world. It is remarkable for its solidity. The great pyramid, erected by Cheops as a tomb for himself, was built of stones 30 ft. in length, quarried in the Arabian mountains, and conveyed by the Nile to a newly-constructed road ⅘ of a mile long, 60 ft. broad, and in a cutting of 48 feet. This road was of polished stone, elaborately carved, and required 10 years for its completion. The Egyptians attained great proficiency in the mechanical arts. Tney possessed not only the power of polishing and carving granite with great facility, but were able to quarry the hardest stone, and raise huge blocks that would task the ingenuity of modern engineers. Next in importance is the sphinx, on which an inscription has been found which seems to prove that it was sculptured before the time of the first pyramid. The tombs of the Egyptians were in the form of truncated pyramids, and built principally of well-squared stone. The grandest architectural efforts of the Egyptians were displayed in their temples, which were first built about the time Thebes became the capital, or 2000 B.C. They were often used as citadels, as few of the towns were fortified. The temple of Edfoo in Upper Egypt is more perfectly characteristic of the arrangement and style of the national temples than any other. The earliest forms of columnar architecture are found in the rock-cut tombs and temples, the principal being that of the palm-tree column, resembling that tree with only the crown leaves. Burnt or sun-dried bricks, marble, granite, and many other materials were used in the construction of buildings. The roofs were of great masses of stone, requiring the use of interior columns; they were flat, but inclined so as to shed rain. The pyramid was the model for all buildings. Minarets and domes were unknown; rude arches were used in the 16th c. B.C., but huge stones were employed for covering lintels and doors, and the arch was neglected. The oldest houses had walls inclined inward, and were but one story high; they were ventilated by a wind-shaft over two screens, like large fans, bending each way to catch the air and direct it down the shaft into the house. The decorations were principally hieroglyphic and emblematic. In 1836, the authorities of New York planned a new prison, originally selecting a style to represent some of the discoveries made in Yucatan a few years before by the traveler John L. Stephens; but finally they decided upon the Egyptian style, and the result is now seen in the prison edifice on Center street known as "The Tombs"

EGYPTIAN LANGUAGE AND LITERATURE. The origin of the most ancient language of Egypt, the hieroglyphic, is unknown. It can be traced, however, as far back as the 3d dynasty, and the date of its discovery was no doubt much earlier than 3000 B.C. It has some points of affinity with the Semitic languages, while differing widely from them in many particulars. Some of its words appear to be of Indo-European origin, and some writers have even placed it in that family of languages. It had two dialects—those of Upper and Lower Egypt; and from these sprang another, the vulgar dialect, which became the national language just before the adoption of the Coptic. The characters of the ancient language present a very complex system, partly pictorial and symbolic, and partly syllabic and alphabetic. Out of this grew the hieratic or common written form of the language, principally used for documents written on papyrus. The demotic writing is a form of the hieratic employed for legal documents from the 26th dynasty downwards. The oldest demotic papyrus is in the museum at Turin, and dates back to 620 B.C. It was used till the 2d c. of the Christian era, after which there was a gradual transition to the Coptic, which is the exclusive vehicle of Christian Egyptian literature. The language nearly died out in the last c., making way for the Arabic. The chief change in the Coptic was in the introduction of Greek words, especially of the religious class. The Coptic is written with the Greek alphabet, with the addition of six new letters and a ligature, the letters being taken from the

demotic to express sounds not used by the Greek. The ancient Egyptian literature, which scholars during the last fifty years have been laboring to decipher and systematize, has not fulfilled the expectations excited by the discoveries of Champollion. Historically considered it is very unsatisfactory, through lack of system. The religious documents are still less orderly. Of the religious works the most important is the *Book of the Dead*, which is a collection of mythical prayers referring to the future state of the disembodied soul. In spite of the best efforts of De Rougé, a man of the highest critical faculty, to present it to us in its most favorable form, it is greatly confused, marked by poverty of thought. The temple inscriptions are stilted and monotonous, but some of the hymns found in the papyri are of a higher order. The historical writings, so far as they are official, are in the worst style of panegyric. Some of the letters present a lively portrayal of the manners of the people. Champollion and his followers have done the world a valuable service in unfolding the mysteries of the ancient Egyptian writings. Though the disclosures thus far made are less important than was anticipated and there are still many perplexing problems to be solved, the fault is not theirs. It is impossible to see any evidence of a chronological development of Egyptian literature, its characteristics being the same in all periods. The religion of Egypt has been generally regarded as polytheistic, but De Rougé thinks it rested upon a monotheistic foundation, the religious writing speaking of one supreme being, self-existent, self-producing, the creator of heaven and earth. Polytheism, whether or not the earliest form of belief, probably held its ground with monotheism. The literature seems to present a mixture of both. The many deities may have been held subordinate to the one supreme and self-existent being, but this was a low form of monotheism, though it may have been a step upward from thorough polytheism. Works of fiction or amusement prevailed in the time of Rameses, and historical accounts during the reigns of the Ptolemies; while homilies, rituals, and other Christian literature entered the country during the Coptic period. Of the magical literature there are many specimens, in which are recorded the conflicts between the good and evil powers, and the incantations, injunctions, and threats of the conjurers. The medical papyri make it probable that the Egyptians had a science of medicine long previous to 3000 B.C. The earlier practice appears to have been rational, without any superstitious intermixtures. Their remedies embraced the milk of animals, honey, salt, vinegar, etc., the application of raw flesh, ammonia, lard, and prescriptions of draughts, unguents, and injections. The later documents are of an inferior kind, containing much magic and incantation. The scientific treatises are of more value, showing that the Egyptians were acquainted with the true motion of the planets, the earth included. They also had an understanding of geometry. Prominent among the ancient epics is that of Pentaur, which has been called the Egyptian Iliad and is several centuries older than the Greek. A translation of it by prof. Goodwin will be found in *The Cambridge Essays*. The satirical writings do not even spare the sacred person of the king. Of judicial documents many have been discovered.

EGYPTIAN VULTURE, *Neophron percnopterus*, one of the smaller *vulturidæ*, of a genus differing from the true vultures in the slender bill, which is covered for more than half its length with a naked cere, and sharply hooked at the point. The head and throat are naked, but feathers extend along the back of the neck to the crown. The E. V. is not much larger than a raven. The plumage of the male is white, except the great quill-feathers, which are black. This bird is plentiful in Egypt, where it renders important service—as also in Turkey, Syria, and other countries—in devouring and so cleansing away carrion from the vicinity of human abodes. It is constantly to be seen in the streets of towns, and seems to be aware that it is regarded with favor, and enjoys the protection of mankind. Europeans in Egypt often call it Pharaoh's hen, or Pharaoh's chicken. It follows caravans in the desert, to devour whatever dies. Numbers are often seen congregrated together, but the E. V. is not truly gregarious, and lives generally in pairs. Its geographic range extends over the whole of Africa, and great part of Asia; it is common in many parts of the s. of Europe, is an inhabitant of the Alps and the Pyrenees, sometimes visits more northern regions, and has been killed in England.

EHNINGEN, a t. of Würtemberg, situated 21 m. s.s.e. of Stuttgart, is the rendezvous of a great number of peddlers who traverse the neighboring districts for the purpose of dispensing of their wares. Pop. about 5,000.

EHNINGER, JOHN WHETTON, b. N. Y., 1827; a graduate of Columbia college, and pupil of Couture, the French painter. Among his works are "Portrait of Peter Stuyvesant;" a study from Irving's "Knickerbocker's History of New York;" "Love me, Love my Horse;" "The Sword;" "The Foray;" "Lady Jane Grey;" etchings for Hood's "Bridge of Sighs;" for Longfellow's "Miles Standish;" etc.

EH'RENBERG, CHRISTIAN GOTTFRIED, one of the most distinguished naturalists of Germany, was b. April 19th, 1795, at Delitsch, in Prussian Saxony. Although he had been originally intended for the clerical profession, he early relinquished the study of theology in favor of medicine; and after having attended the classes at the medical faculty at Leipsic for two years, he removed in 1817 to Berlin, where he graduated in medicine in 1818. His favorite study at this period was botany, and his earliest publica-

tions are devoted to botanical subjects, and more especially to such as demand the use of the microscope—an instrument with which the name and reputation of E. must ever remain inseparably associated; for to him belongs the merit of having rescued it from the discredit into which it had fallen, and of having been one of the first fully to appreciate its capabilities. In 1820, E. accompanied his friend Hemprich on his travels to the east; and after having visited Egypt, Syria, and Arabia, returned, in 1826, to Berlin, where he was appointed to one of the medical chairs of the university, which he occupied until his death. The three years which intervened before he again set forth on a scientific expedition, were devoted to the arrangement and classification of some of the abundant materials which he had accumulated in his eastern travels; and to this period belong the composition of his *Akalephen des Rothen Meeres*—which has largely contributed towards our knowledge of the medusæ—and his *Symbolæ Physicæ*. In 1829, E. accompanied G. Rose and A. von Humboldt on an expedition to the Ural and Altai mountains, in the course of which he collected materials for his numerous memoirs on the Infusoria, and for his great work *Infusionsthierchen*, published at Leipsic in 1838, which have identified his name with the history and study of this department of animal life. E. divided the infusoria into rotatoria (now found to belong to higher orders of animal life) and polygastrica, which correspond more nearly with the infusoria as now admitted, although many of his polygastric organisms have been found to be vegetable structures, and some to be the larval forms of worms, etc. E.'s researches have not been confined to living organisms, but include fossil infusoria; and his great work, *Mikrologie*, on the application of the microscope to geology, contains the results of his investigation in this department of inquiry. E. was a member of most of the scientific bodies of Europe, and was for nearly fifty years an active contributor to the scientific literature of his country. He died Sept., 1876.

EHRENBREITSTEIN (Honor's Broad Stone), a t. and fortress of Rhenish Prussia, is picturesquely situated on the right bank of the Rhine, directly opposite Coblenz, with which it is connected by a bridge of boats. The town of E. has several mills, a tobacco-manufactory, a flourishing trade in wine, corn, and iron, two cattle-markets, and four annual fairs. Pop. '71, 4,657. The fortress of E. occupies the summit of a precipitous rock 490 ft. high, and has been called the Gibraltar of the Rhine, on account of its great natural strength and its superior works. On three sides the fortress is so precipitous as to be perfectly inaccessible; on the fourth and only approachable side, the n. w., it is fortified by three successive lines of defenses, one within another. It is defended by 400 pieces of cannon; has cisterns capacious enough to hold a supply of water for three years, and a well sunk 400 ft. deep in the rock, and having communication with the Rhine. E. was besieged in vain by the French in 1688, but fell into their hands in 1799, after a siege of 14 months. Two years after, the French, on leaving E., at the peace of Luneville, blew up the works. It was assigned, however, to Prussia by the Congress of Vienna in 1814, and under that country was restored and thoroughly fortified. It is now one of the strongest forts in Europe. It is capable of accommodating a garrison of 14,000 men, and provisions for 8,000 men for 10 years can be stowed in its vast magazines. The view from the fortress, which comprehends a considerable portion of the course of the Rhine, including its confluence with the Moselle, is picturesque in the highest degree.

EI'BENSTOCK, a t. of the kingdom of Saxony, in the circle of Zwickau, and 16 m. s.s.e. from Zwickau. It stands in a high and bleak district. It has extensive manufactures of chemical products, muslins, lace, tobacco, and tinware, and a considerable trade in cattle. Medicinal plants are very extensively cultivated. Pop. '75, 6,773.

EICHBERG, JULIUS; b. Germany, 1825; educated in the conservatory at Brussels; musical director in Germany and Switzerland. In 1856, he established a musical conservatory in Boston, Mass., where he was for several years teacher of music in the public schools. He has written *The Doctor of Alcantara; The Rose of Tyrol;* and other operas.

EICH'HORN, JOHANN GOTTFRIED, one of the most distinguished scholars produced by Germany, was born at Dörinzimmern, in the principality of Hohenlohe-Oehringen, in 1752, and studied at Göttingen. He first became rector of the school of Ohrdruff, in the duchy of Gotha, afterwards, in 1775, professor of oriental languages in the university of Jena, and in 1788 removed to Göttingen in the like capacity. Of this university he continued a distinguished ornament till his death in 1827.

His scholarship was almost universal, and he has left numerous treatises on a multitude of subjects, both ancient and modern, classical and oriental, but he is chiefly known in this country as a Biblical critic, and a chief of what is called the rational school. E. examined the Scriptures from an anti-supernatural point of view, but applied to their elucidation and criticism an unrivaled knowledge of oriental and Biblical antiquities. Miraculous appearances recorded in the Bible are held by him to be explainable as natural events, and everything is to be brought to the test of reason. Rationalism in this form can hardly be said to exist now, even in Germany; but some of E.'s views as to the historical origin of the canonical gospels have been extensively adopted. His chief works on this subject are a Universal Library of Biblical Literature (*Allgemeine Bibliothek der Biblischen Literatur*, 10 vols., Leip. 1787–1801); an Intro-

duction to the Old Testament (*Einleitung in das Alte Testament*, 4th ed. 5 vols., Gött. 1824); an Introduction to the New Testament (*Einleitung in das Neue Testament*, 5 vols., Gött. 1824–27); and an Introduction to the Apocryphal Writings of the Old Testament (*Einleitung in die Apokryphischen Schriften des Alten Testaments*, Gött., 1798). In a work entitled Primitive History (*Urgeschichte*, 2 vols., Nürnb. 1790–93), he subjects the Pentateuch to bold criticism. His last work was a History of the House of Guelf, which he traces back to the 5th c. (*Urgeschichte des Hauses Welfen*, Han. 1817).

EICH'STADT (earlier AICHSTÄDT, Lat. *Aureatum*, *Arborfelix*, or *Dryopolis*, the last signifying the same as Aichstädt—viz., Oak-town), a t. of Bavaria, is situated in a deep valley on the left bank of the Altmühl, about 40 m. w.s.w. of Regensburg, in lat. 48° 53′ n., long. 11° 11′ east. It consists of the town proper, with four suburbs, is well built, and has several fine squares, one of which is adorned with a fountain and a statue of St. Wilibald, the first bishop of Eichstadt. Among the notable buildings are the palace of the duke of Leuchtenberg, containing a museum of antiquities and some good portraits; the cathedral, founded in 1259, an imposing Gothic structure, with monuments in bronze and marble, good paintings, and fine painted glass; the town-house (1444), with a square tower; and the Wilibaldsburg, or castle of St. Wilibald, built on an eminence 1200 ft. high, and lately used as a barracks. The manufactures are woolen and cotton fabrics, ironmongery, and stoneware; there are also breweries, and several mills. Pop. '75, 7,136. E. is of Roman origin, and in 908 was surrounded by walls. The bishopric of E. was founded as early as 745. E. came into the possession of Bavaria in 1805. In 1811, Eichstadt, along with the landgraviate of Leuchtenberg, was bestowed upon Eugene Beauharnais, duke of Leuchtenberg, but reverted to Bavaria in 1853.

EICHWALD, EDUARD, a Russian naturalist, was b. at Mitau, in Russia, 4th July, 1795, and studied the physical sciences and medicine at Berlin, 1814–17. After spending some years in travel, he returned to Russia, and in 1823 was appointed professor of zoology and midwifery at Kasan. In 1827, he accepted a call to Wilna as professor of zoology and comparative anatomy; and in 1838 he went to St. Petersburg as professor of mineralogy and zoology. E. has been a great traveler for scientific purposes. He has investigated the shores of the Caspian sea, the Caucasus, Persia, Germany, Switzerland, and France, traveled over the greater part of Russia, including the Scandinavian provinces, and in 1840 made a geological journey through Italy, Sicily, and Algeria. He has unquestionably been of more service to Russia by his geognostic, botanical, and zoological researches than any man since Pallas. His principal writings are *Zoologia Specialis* (Wilna, 1829–31), *Plantarum Novarum quas in Itinere Caspio-Caucas observavit, Fasciculi* (Wilna and Leip. 1831–33), *Travels to the Caspian Sea and the Caucasus* (Stuttg. (1834–37), *Memoir on the Mineral Riches of the Western Provinces of Russia* (Wilna, 1835), *Palæozoic Russia* (1840), and in 1851, *The Palæontology of Russia* (St. Petersburg, 1851). E. is a member of all the Russian, and of many foreign academies and learned societies.

EIDER, a river of n. Germany, forming the boundary-line between Schleswig on the n., and Holstein on the south. It rises 12 m. s.w. of Kiel, flows first n.w., then in a general westward direction, though with many windings, and enters the North sea at Tönning, after a course of about 90 miles. It is navigable as far as Rendsburg, from which town the Schleswig-Holstein canal stretches e. to Kiel fiord, on the shore of the Baltic, thus establishing water-communication between the North and Baltic seas.

EI'DER, or EI'DER-DUCK (*somateria*), a genus of oceanic ducks, having the hind-toe furnished with a deep lobe, and the bill swollen and elevated at the base, and extending up the forehead, where it is divided down the middle by an elongated projection of feathers. The tertials are elongated, and fall down over the wing. This genus is further characterized by the very abundant development of a fine elastic gray down, particularly on the breast, the valuable *eider-down* of commerce.—The COMMON E. (*S. mollissima*) is intermediate in size between a common duck and a goose; not much exceeding the common duck in entire length, because of the comparative shortness of the neck, characteristic of the oceanic ducks, but being about twice its weight. The male is larger than the female; and in the breeding season, has the under parts black, the upper parts and the neck white, the crown of the head velvety black, the cheeks greenish white. After the breeding season, the white color almost disappears from the upper parts, and gives place to black, without change of feathers. The female is of a pale-brown color, tinged with red, and varied with transverse marks of dark brown. Young males at first resemble the females, and do not acquire the full adult plumage till their third winter. The young are termed brattocks in many parts of Scotland. The E. is an inhabitant of the northern parts of the world, abounding on arctic and subarctic shores, and becoming rarer in more southern and temperate regions. It is merely an occasional winter visitant in the middle latitudes of Europe, and the Fern islands are its most southern breeding-place on the British coast. In North America it seldom breeds further s. than the bay of Fundy. Great numbers breed on the coasts of Labrador and more northern parts of America, where hitherto the gathering of the down has been generally neglected; but in Iceland and Norway the breeding-grounds of eiders are carefully protected, and are transmitted as valuable inheritances from father to son. Cattle are sometimes removed from islets, in order to induce the eiders

to settle upon them, and a strict watch is kept against dogs and foxes. Promontories are sometimes even formed into artificial islets, on the same account, as the E., like many other sea-birds, prefers islands for its breeding-places, probably on account of their greater quiet and security. The nest is formed of fine sea-weeds, mosses, and dry twigs, if they are to be had, matted and interlaced. The eggs are usually five, sometimes six or seven in number, about 3 in. long, and fully 2 in. broad, of a uniform pale green: they are at first deposited without any down, but as incubation proceeds, the mother strips the down from her breast, and places it about them. By it they are kept warm when she at any time has occasion to leave them, but it seems to be indispensable to their being hatched; for if the eggs and down are removed, and if this is done a second time, so that the female cannot afford a further supply, the male comes and contributes for the third set of eggs the down of his breast, which is of a paler color. The common practice in Norway and Iceland is to take away the eggs and down twice, leaving the third set of eggs to increase the number of the species. The eiders of the Icelandic and Norwegian breeding grounds show so little alarm at the approach of visitors that the females will permit themselves to be touched as they sit on their nests, the males moving about close beside them, but agitated and disturbed. The nests are often placed so close together that great care is necessary in walking among them to avoid trampling upon them. In the islet of Vidöe, a valuable breeding ground near Reikiavik, the capital of Iceland, almost every little hollow place between the rocks is occupied by the nests of these fowls; they readily take possession of holes cut for them in rows in the sloping side of a hill; nay, garden-walls and the interiors of buildings are in like manner occupied. In Orkney and Shetland the E. is commonly known by the name of dunter-duck.

The E. is sometimes called ST. CUTHBERT'S DUCK, from a rock called St. Cuthbert's isle, one of the Fern islands. It seems probable that, with due care, the number of the eiders at the Fern islands, and some of the Scottish islands, might be greatly increased, and their down yield a considerable revenue; but at present their eggs are indiscriminately taken with those of other sea-birds, and no protection is extended to them. The eggs are remarkably fine. The flesh of the birds, also, is not unpleasant, and is said to become of superior excellence when they are partially domesticated, and when farinaceous food is mixed in considerable quantity with their natural diet of marine mollusks, crustaceans, etc. The complete domestication of the E. has been successfully attempted, where access could be obtained to the sea.

About half a pound of eider-down is said to be annually obtained from each nest, but this is reduced by cleaning to a quarter of a pound. The elasticity of the down is such that three quarters of an ounce of it will fill a large hat, although two or three pounds of it may be pressed into a ball and held in the hand. Its extensive use, particularly in Germany and other parts of the continent of Europe, for stuffing the bed-coverings, which there usually supply the place of blankets, etc., is well known. The down taken from birds which have been killed is inferior in quality to that obtained from the nests. The latter is known in commerce as *live down*, the former as *dead down*.

The KING EIDER, or KING DUCK (*S. spectabilis*), also yields no inconsiderable part of the eider-down of commerce, especially of that which is brought from the Danish settlements in Greenland. This bird belongs to still higher northern latitudes than the common eider. On some parts of the coasts of Greenland, on those of Spitzbergen, Nova Zembla, the North Georgian islands, etc., it occurs in great numbers. A few breed in Iceland and the Faröe islands. In Britain, the bird is a rare visitant. It is of about the same size as the common eider The female is very similar to the female of that species; but the male has a remarkable large protuberance over the base of the upper mandible, and the white color of the neck extends only over the upper part of the back. Skins of king ducks are made into winter garments by the inhabitants of Siberia and Kamtcha'ka.

EIGHT, PIECE OF, a name once popularly given to the Spanish dollar, as being divided into 8 reals.

EIGHT-FOIL, used in heraldry to signify a grass having eight leaves, as the trefoil has three. According to Sylvanus Morgan, it may be used as the difference of the ninth branch of a family.

EIGHT-HOUR LAW, an act adopted by the U. S. congress in 1868, and subsequently by the legislatures of a number of the states, providing that in all government employment eight hours shall constitute a day's work. It was expected that this would have an influence on the practice in private employment. However desirable this result, the expectation has as yet been realized in only a small degree, as the labor-market seems to develop its own laws in its own time and way.

EIK, in the legal phraseology of Scotland, is an addition made to a document for the purpose of meeting circumstances which have subsequently arisen. Thus, a reversion being a deed granted by a borrower, who reserves to himself the right of redeeming land which he has conveyed in security to the lender (see WADSET), an E. to a reversion is a subsequent deed by the reverser acknowledging the receipt of a further sum, and declaring that the property shall not be redeemable until repayment of the addi-

tional loan. In like manner, an E. to a confirmation or testament is an addition to the inventory made up by an executor at his confirmation, in consequence of additional effects belonging to the deceased having been discovered. Where the executor appears to have fraudulently omitted or undervalued any effects belonging to the deceased, any creditor or person interested may apply to the commissary to be confirmed executor with reference to these additional effects, *ad omissa vel male appretiata*.

EI'KON BASILIKĒ, a work presumed to have been written by Charles I. during his confinement, but now more correctly imputed to another writer. The following are the explanations of M. Guizot on the subject, in his *History of Oliver Cromwell and the English Commonwealth:* "It is to the *Eikon Basilikè* that Charles I. is principally indebted for the name of the royal martyr. The work is not by him; external testimony and internal evidence both combine to remove all doubt on the matter. Dr. Gauden, bishop, first of Exeter and afterwards of Worcester, under the reign of Charles II., was its real author; but the manuscript had probably been perused and approved, perhaps even corrected, by Charles himself during his residence in the Isle of Wight. In any case, it was the real expression and true portraiture of his position, character, and mind, as they had been formed by misfortune; it is remarkable for an elevation of thought which is at once natural and strained; a constant mingling of blind royal pride and sincere Christian humility; heart-impulses struggling against habits of obstinate self-consciousness; true piety in the midst of misguided conduct; invincible, though somewhat inert devotion to his faith, his honor, and his rank; and as all these sentiments are expressed in monotonous language, which, though often emphatic, is always grave, tranquil, and even unctuous, with serenity and sadness, it is not surprising that such a work should have profoundly affected all royalist hearts, and easily persuaded them that it was the king himself who addressed them."—Vol i. p. 31.

EILDON HILLS, three peaks in Roxburghshire, Scotland, near the romantic village of Melrose, commanding a view of the splendid scenery of the region. The story is that the renowned wizard, Michael Scot, found but one mountain there but divided it into three peaks. None of them are over 1400 ft. in height.

EI'LENBURG, a t. of Prussian Saxony, is situated on an island of the river Mulde, 26 m. e.n.e. of Merseburg. It is reached by two bridges, is surrounded by walls and ditches, and consists of the town proper with four suburbs. The manufactures of E. consist of calico, woolen yarn, tobacco, chemicals, beer, and agricultural implements. Pop. '75, 10,312.

EILETHYIA, a city of Egypt, anciently Nuben, and known at present by the name of El Kab. The town was anciently walled. The present ruins consist of the remains of small temples dedicated by Rameses II. to Ra; a Ptolemaic temple dedicated to the Eponymous goddess by Physcon or Energetes II., with additions by Ptolemy Alexander I., and Cleopatra; and another temple dedicated by Amenophis III. to the local deities. The names of other monarchs are also found in the ruins; but the most interesting and important remains are the rock-tombs excavated in the vicinity. That of Aahmes-Pensuben, a functionary, records his military services in the wars of the early monarchs of the 18th dynasty against the Shos or shepherds, and other Asiatic and Nigritic races. Another, of Pahri, is decorated with paintings representing the pursuits of agriculture. Swine were sacred to the local goddess. The town itself, during the 18th dynasty, appears to have been governed by princes, and some of the tombs appear as late as the 19th and 20th dynasties.—Wilkinson, *Modern Egypt*, vol. ii. p. 270; Champollion, *Notice Descriptive*, p. 265; Brugsch, *Reiseberichte aus Aegypten*, p. 214.

EIMBECK, or EINBECK, an old t. of Hanover, is situated on the Ilme, 40 m. s.s.e. from Hanover, in lat. 51° 49′ n., long. 9° 50′ east. It was a place of considerable importance in the 15th c., and was a Hanse city, but has decayed greatly in recent times. The minster is large and beautiful. The houses of E. are antiquated; its streets narrow, tortuous, and badly paved. One portion of the town, however, which was burned down in 1826, has been rebuilt in a greatly improved manner. E. has manufactures of woolens, cottons, and linens, and chemical products; and has distilleries, breweries, tanneries, and tobacco factories. E. owes its origin to the pilgrimages made to the chapel of the Holy Blood, founded here in 1094 by count Alexander von Darni. Pop. '75, 6,384.

EIMEO, one of the Society islands, in the Pacific ocean, lies in lat. 17° 30′ s., and long. 150° 10′ w., about 30 m. to the w.n.w. of Tahiti, the principal member of the group. It measures 9 m. by 5, and numbers about 1300 inhabitants. It consists of deep valleys and abrupt hills—the former well cultivated, and the latter heavily timbered. It is worthy of notice chiefly as the cradle of Polynesian Christianity. Here, in or about 1814, occurred the first popular manifestation in favor of the new religion; and here was established, as an instrument of evangelization, the South Sea college of the London missionary society.

EINSIEDELN, a small t. of Switzerland, in the canton of Schwytz, and 9 m. n.n.e. of the town of that name. It is worthy of mention on account of its Benedictine abbey, containing a black image of the Virgin, to which about 150,000 pilgrims annually repair. The town has 55 inns and 20 alehouses, supported chiefly by the pilgrims. The dedication

festival of the abbey, 14th Sept., is the great pilgrimage season. The present abbey, one of the finest in Switzerland, was built at the beginning of the 18th c., and is the fifth since the foundation of the abbey, in the 10th century. Its treasury was rifled by the French in 1798. Pop. '70, 7,633.

EIRE, EYRE, JUSTICES IN (corruption of Lat. *in itinere*). By this term, both in England and Scotland, were the judges of assize (q.v.) formerly designated. Justices in eire were first established in England by the statute of Northampton (1176 A.D.), in the reign of Henry II. At first, they made the circuit of the kingdom once in seven years; but by Magna Charta, c. 12, the chief justices are directed to send justices through every county once in the year. In Scotland, the chief justiciar, says Erskine, i. 3, s. 25, was originally bound to hold yearly two justice courts or aires at Edinburgh and Peebles. This court gradually became fixed at Edinburgh. Besides this court, special "justice aires" were frequently held in the more remote parts of the country by the king in person, or by judges named by him, twice in the year, in spring and autumn (st. Robert III. c. 30, 1440 c. 5, 1491 c. 29). These courts were discontinued, but revived by 1587, c. 81. The term is still in use in Scotland, where, at the commencement of every circuit, proclamation is made to the lieges to attend the "circuit eire."

EI'SENACH, a t. of Germany, Saxe Weimar, is beautifully situated amid finely wooded hills on the Hörsel, 45 m. w. from Weimar. Once the capital of a principality to which it gave name, E. is still a prosperous and industrious town, and is well built, with wide, clean, and well-paved streets. E. has a ducal palace, a large and handsome building, now used as a court-house; a spacious market-place, including a handsome civic school; numerous churches; and a school of design. Its manufactures are woolen, cotton, and linen goods, soap, white lead, meerschaum pipe-bowls, leather, and carpets; there are also breweries and tanneries, and oil, powder, and spinning mills. Pop. '75, 16,193.

On a lofty eminence in the immediate vicinity, surrounded by forests, stands the castle of Wartburg, now used as a prison, but formerly a residence of the landgraves of Thuringia, and worthy of notice as the spot where the Minnesingers (q.v.) assembled to hold a trial of skill in 1207, but chiefly as being the asylum to which Luther, at a time of great danger, was carried by his friend the elector of Saxony, who, waylaying the great reformer, seized him, with an appearance of violence, and hurried him to this fastness, where he remained in safety from May, 1521, to Mar., 1522. The chapel in which Luther preached, as well as the chamber which he inhabited, and in which he discomfited the evil one by throwing the inkstand at his head, is still pointed out. Another portion of the castle contains a fine armory, with suits of the 16th and 17th, and even, it is said, of the 13th and 14th centuries.

EI'SENBERG (Ger., Iron Mountain), a small t. of Germany, in the duchy of Saxe-Altenburg, is situated on an eminence near the Saale, 26 m. e. of Weimar. It is well built, its chief edifices being the castle, the observatory, the lyceum, and the town-house. E. has manufactures of woolens, porcelain, and eathen ware, and has five annual fairs. Pop. '71, 5,261.

EI'SENBURG, or VAS VARMEGYE, a co. in w. Hungary, on the border of Styria; 1782 sq.m.; pop. '70, 331,602. It is mountainous, fertile, and well watered. The productions are coal, mineral waters, quicksilver, corn, wine, fruit, and tobacco. Chief town, Szembathely, or Stein-am-Anger.

EISENERZ, a small t. of Austria, in the n. of the province of Styria, 20 m. w.n.w. of Bruck. Its appearance is dirty and unprepossessing, and it is worthy of mention only for its connection with the Erzberg (ore mountain), at the southern base of which the town lies. This mountain, which is about 2,840 ft. high, and about 5 m. in circumference at the base, is literally a solid mass of iron ore, of a quality so rich, that, instead of cutting mines into it and following the metal in veins—which process was formerly adopted here—the top and sides of the rock are quarried from the outside, and the ore is then broken small, and conveyed to the smelting-house without further preparation. Mines have been worked on this mountain for upwards of 1000 years. Arragonite (*eisenblüte*, or *flos ferri*), resembling branching coral in form, and of the most beautiful and purest white, is found in grottoes in the interior of the mountain. Nowhere else does it occur in equal perfection. Pop. '69, 3,841, employed in mining. In 1872, 2,044,820 centner, or about 125,000 tons, of pig-iron were produced.

EISENSTADT, a free t. of e. Hungary, stands in lat. 47° 50' n., and long. 16° 30' e., 12 m. n.n.w. of Oedenburg. It is a walled town, has two gates, and consists principally of three main streets. It has also a Franciscan monastery, containing the burial-vault of the Esterhazy family, who are the proprietors of the palace, which forms the chief architectural feature of Eisenstadt. This palace was built in 1683, but was altered and enlarged in 1805. It contains 200 chambers for guests, and has a saloon sufficiently large to dine 1000 people. Its library contains a magnificent collection of church-music—masses, litanies, oratorios, etc., with some of Handel's MSS. In the suburbs is a conservatory, one of the largest in Europe, containing 70,000 specimens of exotic plants. Pop. '69, 2,476.

EISLE'BEN, a t. of Prussian Saxony, is situated about 20 m. w. of Halle E., once capital of the counts of Mansfeld, is the center of a rich mining district, and consists of old town, new town, and suburbs. E. makes large quantities of beer, and has manufactories of potash and tobacco; in the vicinity are copper and silver mines, producing yearly about 1,000 tons of copper, and 25 tons of silver. Pop. '75, 14,578. Here, on Nov. 10, 1483, Luther was born, and here also he died, Feb. 16, 1546. The house in which he was born was partially consumed by fire in 1689 An interesting remnant of it, however, is still extant, having the portrait of Luther placed over the entrance. In the church of St. Andrew are the cap, cloak, and other relics of the great reformer.

EISTEDDFODS, the name given to the gathering of Welsh bards for competition in national minstrelsy. See BARD, and WELSH LANGUAGE AND LITERATURE,

EJECTMENT, ACTION OF (*ejectio firmæ*), in English law, "is a possessory action, wherein the title to lands and tenements may be tried, and the possession recovered, in all cases where the party claiming title has a right of entry."—Selwyn's *Nisi Prius.* "The action of ejectment," says lord Mansfield, "is the creature of Westminster hall, introduced within time of memory, and molded gradually into a course of practice by rules of the courts."—*Fairclaim & Fowler* v. *Shamtitle,* 3 Burr. 1292. According to the strict rules of common law, a person dispossessed of his property in land, etc., was obliged to enforce his right by means of one of the forms of real action (q.v.) now abolished. But as the form of action differed according to the nature of the possession of the holder of the land, this process was tedious and inconvenient. In order to remedy this defect, the action of ejectment was by degrees adopted as a means of establishing a title to land. This action was at first applicable to the special case where the plaintiff was lessee for years, and it was limited originally to a demand for damages simply But it is said that as early as the reign of Richard II. or Edward IV., the court gave judgment that the plaintiff should also recover the term and the possession of the land. The action having thus acquired in some measure the character of a real action, it was found convenient to extend its effect. By means of a legal fiction, introduced in the time of Henry VII., the action was first applied to the purpose of enforcing a title to land. The process adopted was as follows. The judges having declared that a tenant for years succeeding in his action should have possession, the claimant of the land commenced by feigning a lease for years granted by himself to an imaginary lessee, John Doe. It would seem that at first the plaintiff actually granted a formal lease to a friend, who was also formally ousted, in order to raise the question of title. But these men of straw being removed as the cause proceeded, it was soon found that they might be altogether dispensed with, and the fictitious John Doe and Richard Roe substituted in their room. The declaration proceeded to state that upon this lease Doe entered, and that Richard Roe, also an imaginary person, had ousted him. Notice of this action was then given to the actual tenant of the lands, together with a letter from the imaginary Richard Roe stating that he should make no appearance to the action, and warning the tenant to defend his own interest. If no appearance was made, judgment was given in favor of the plaintiff, who thereupon became entitled to turn out the tenant in possession. But if the latter made appearance, the first step in the action was a formal acknowldgement by him of his possession of the lands, of the lease in favor of Doe, of Doe's entry, and of the ouster by the tenant himself. These matters, be it remembered, were, in fact, mere fictions; but having been introduced on the record simply to comply with the technical rules of legal title, they were equally readily removed when the real question at issue presented itself. This reduced the cause to the simple question of the right of the plaintiff to grant the lease to Doe, and thus the title to the land became the real question at issue. But it must be observed that this remedy was confined to the case of one having a right of entry (q.v.). Where, therefore, a person had suffered a deforcement or discontinuance (q.v.), he was still obliged to resort to a real action to establish his right. This state of things continued till 3 and 4 Will. IV. c. 27, whereby the remedy by ejectment was, with a few exceptions, in fact extended to every one who alleged that he was wrongfully dispossessed; but it was at the same time provided that no action should be brought to recover land but within twenty years after the right accrued. But while the remedy was thus extended, the same elaborate string of fictions was suffered to continue until the passing of the common law procedure act (15 and 16 Vict. c. 76), whereby the ancient machinery is quite swept away. The action now commences by a simple writ addressed to the tenant in possession, and "to all persons entitled to defend the possession," setting forth that the plaintiff has asserted a claim to the land, and calling upon those interested to appear within a certain time to defend their right. The writ also contains a notice that, in default of appearance, the tenant in possession will be ejected. On appearance being made, issue is joined, and the cause proceeds as in ordinary actions. Judgment in ejectment will not carry the mesne profits or rents. In some cases of forcible entry, justices of the peace can also summarily eject the intruder and give possession.

EJECTMENT, ACTION OF (*ante*). In the state of New York, as early as 1830, actions for ejectment were placed upon substantially the same ground as that established in England in 1852 by the act 15 and 16 Vict. c. 76. If the plaintiff succeed in his action upon this

ground, he has cause for another action to recover for the loss sustained by the defendant's wrongful possession. This is called an action of trespass for intermediate profits. In some states the two causes of action may be joined in one.

EJOO. See GOMUTO.

EJUT'LA, a t. of Mexico, in the province of Oajaca, on a small river, 250 m. s.s.e. of Mexico city. It was the capital of a department of the same name, in the new division of the country made by Maximilian. Pop. 7,128.

EKATERINBURG', a fortified t. of Russia, in the province of Perm, is situated on the eastern slope of the Ural mountains, on both banks of the Isset, in lat. 56° 50′ n., long. 60° 7′ east. It is a well-built town, its streets long and straight, but unpaved. As a substitute, however, planks are laid along the sides of the streets, and used as footpaths. The majority of the houses are of wood, but there are also many very handsome stone buildings. In the southern portion of the town, which is connected with the northern by a fine bridge, are the government magazines, the mills, factories, and the market-place. The opposite side, however, is the handsomer. It contains the dwellings of the mine proprietors and of the merchants, and is laid out in elegant and spacious streets. E. is the seat of administration for the Ural mines, and is in the center of the mining districts of these mountains. Among its institutions, it has a museum of mineralogy, an excellent chemical laboratory, a school for educating miners, an imperial mint, numerous works for cleansing and amalgamating metals, and for cutting and polishing precious stones. The greater number of the inhabitants are supported by the productiveness of the neighboring mines. E. stands on the high-road between Russia and Siberia, and is therefore a place of brisk trade. In the vicinity are the gold mines of Niviansk and Beresoff. Pop. '67, 24,508. E. was founded by Peter the great in 1723. Its average temperature during the year is 31° 9′.

EKATERINODAR', a t. of Russia, and capital of the country of the Cossacks of the Black sea, is situated on the right bank of the river Kuban, about 100 m. from its mouth, in lat 45° 5′ n., long. 39° east. It is surrounded on all sides by swamp and morass. Its houses are almost all of earth, have thatched roofs, and are of one story in height. The streets are broad, regular, and straight, but exceedingly dirty. E. has a cathedral with six wooden towers, and a wooden fortress. Pop. '67, 8,753.

EKATERINOGRAD', a t and fortress in the s. of Russia, in the government of Caucasus, is situated on the left bank of the Terek, in lat. 43° 40′ n., and long. 44° 3′ east. It is an important military post of the Cossacks; its houses are regular, but miserably built. A stone triumphal arch was erected at E. by Catharine II., in memory of prince Potemkin, who founded the town in 1777. Pheasants abound here, and form a principal article of food. Pop. about 3,000.

EKATERINOSLAV', a government of Russia, in the province of South Russia, bounded on the n. by Little Russia, and on the s. reaching in one part to the shores of the sea of Azov. The government of E., together with that isolated portion of it which lies on the eastern border of the sea of Azov, and comprises the district of Taganrog and the country of the Azovian Cossacks, has, in all, an area of 26,050 sq.m., and in 1870, had 1,852,300 inhabitants. Only about one third of the entire area consists of cultivable land, the remainder being desert (see STEPPE). The climate is mild, and a great many highly esteemed fruits, as apricots, peaches, cherries, etc., which do not occur in the more northern parts of Russia, are found here. E. possesses deep and extensive beds of coal. Though, in 1870, not more than fifty tons were raised, the quantity had within three or four years increased to many thousand tons annually.

EKATERINOSLAV, a fortified t. of South Russia, is situated on the right bank of the Dnieper, 250 m. n.e. from Odessa, in lat. 48° 27′ n., long. 35° 5′ east. It was founded in 1787 by the empress Catharine II. The streets are long and broad, but not so clean or so well filled with houses as they might be. E. has manufactures of silk and woolen goods, and an important annual wool-fair. It is the residence of an archbishop. In the vicinity is a palace, now in a ruinous condition, formerly the residence of prince Potemkin. Pop '67, 22,548.

EKHMIM', or AKHMIM, a t. of Upper Egypt, 53 m. s.s.e. from Siout, on the right bank of the Nile, and about a quarter of a mile from it. It occupies the site of the ancient *Chemnis*, or *Panopolis*, one of the great cities of the Thebaid. Remains of ancient buildings exist. Cotton fabrics are manufactured here. Pop. supposed to be about 10,000.

EKRON, the most northerly of the five cities of the Philistines. It was assigned to Judah, but afterwards given to Dan. Before the monarchy it again came under the rule of the Philistines. It was the last place to which the captured ark of the covenant was taken by the Philistines, before its restoration to the Israelites. After David's victory over Goliath, the Philistines were pursued as far as this place. The name occurs in cuneiform inscriptions and on Syrian monuments. The site has been recognized in Akir, a Moslem village 5 m. s.w. of Ramleh. It has a dreary and forsaken appearance.

ELÆAG'NUS, a genus of exogenous plants, of the natural order *elæagnaceæ*. This order consists of trees and shrubs, usually covered with scurfy scales, and having alternate or opposite entire leaves, without stipules. There are only about thirty known species of this order, all natives of the northern hemisphere, but found both in its warm and cold regions. The sallowthorn (q.v.) is the only British species. *Shepherdia argentea*, a North American shrub of this order, yields a pleasant fruit. The genus *elæagnus* consists of a number of deciduous shrubs or low trees, with male and female flowers on the same plant. *E. angustifolia*, the OLEASTER, sometimes called wild olive, is a native of the s. of Europe and the Levant, a spiny tree of 15 to 20 ft. in height, with lanceolate leaves, which, as well as the young shoots, are hoary with stellate hairs. It is frequently planted in England, for the sake of its silvery white foliage, beautifully contrasting with the green of other trees, and its very fragrant flowers, which are small and of a dull yellow color.

ELÆIS. See OIL PALM.

ELÆOCARPA'CEÆ, according to some botanists, a natural order of exogenous plants, but regarded by others as merely a sub-order of *tiliaceæ*; the chief distinctions being deeply cut or fringed petals and anthers opening at the apex. The E. are mostly East Indian trees. The fruits of some are eaten; those of some are dried and put into curries; those of *elæocarpus serratus* are pickled in brine and eaten with oil in Ceylon, and much resemble olives. *E. cyaneus*, a native of New Holland, is here figured. The deeply wrinkled seed or stone of the fruit of some, particularly *elæocarpus ganitrus* and *monocera tuberculata*, being very hard, and having a fine sculptured appearance, are made into beads for necklaces and bracelets, and are sometimes set in gold. They are often called OLIVE NUTS. These beads are frequently worn by religious devotees in India, and are sometimes sold as ornaments in the shops of Europe.

ELÆOCOC'CA, a genus of *euphorbiaceæ*, the seeds of some of which yield useful oils. The oil obtained from *E. verrucosa* is used for food in Japan, notwithstanding considerable acridity. The tree is cultivated in the Mauritius, and the oil is there used only for burning. That obtained from *E. vernicia* is used in painting in China.

ELÆODEN'DRON, a genus of trees of the natural order *celastraceæ*, having a 5-partite calyx, 5 petals, a 5-angled disk, 5 stamens, the ovary immersed in the disk, and a drupaceous fruit. *E. glaucum*, a native of Ceylon and the s. of India, is sometimes called the *Ceylon tea-tree*, from the resemblance of its leaves to those of the tea-shrub. The timber of *E. croceum*, called SAFFRONWOOD at the cape of Good Hope, is much used there in building and cabinet-making; it is fine-grained, hard, and tough. The fruit of *E. kuba*, another South African species, is eaten by the colonists. That of *E. argan* yields an oil similar to olive oil, much used by the Moors.

ELAGAB'ALUS, or HELIOGABALUS, emperor of Rome, was b. at Emesa in 204 A.D. His real name was Varius Avitus Bassianus, but having, when a mere child, been appointed high-priest of the Syro-Phenician sun-god Elagabal, he assumed the name of that deity. Soon after the death of his cousin Caracalla, E. was proclaimed emperor by the soldiers, in opposition to the legitimate sovereign, Macrinus, who had become obnoxious to the troops from the severity of his discipline. The rivals met in battle at Antioch in 218 A.D. Macrinus was defeated, and E. quietly assumed the purple. His reign, which lasted rather more than three years and nine months, was infamous for nearly unparalleled debaucheries of every kind in which he indulged. He was murdered in an insurrection of the prætorians in 222 A.D., and was succeeded by his cousin and adopted son, Alexander Severus.

EL-ARA'BAH is the name of the great depression of country which extends from the Dead sea to the gulf of Akabah. From the foot of Mt. Hermon to the Elanitic gulf of the Red sea there is a deep valley that is classed by geographers among the most remarkable depressions on the globe. It is divided by a line of chalk cliffs, which cross it about 6 m. s. of the Dead sea. North of these the valley, at the present day, is named El-Ghor (q.v.); s. of them the old Hebrew name El-Arabah is retained. The whole length of this part is about 100 miles. Its greatest width, 60 m. n. of the gulf of Akabah, is from 10 to 12 m.; its least at the gulf, not more than 3 or 4 miles. On the *western* side are the horizontal lines of the Tih, white and desolate, mounting up 1500 or 1800 ft. from the valley by huge steps, with level barren tracts on their tops, and crowned by the plateau of "the wilderness of the wanderings." This range has two principal passes; one, very steep and difficult, is close to the gulf, and is known simply as "the pass." Through it the Mecca pilgrims climb. The other, on the road from Petra to Hebron and leading up from the plateau to a level 1000 ft. higher, is probably the point at which the Israelites, when attempting against the divine command to "go up" into the promised land, were repulsed by the Amalekites coming down from the hill. On the *eastern* side are the mountains of Edom, which rise to a height of more than 2,000 ft., and are crowned by Mt. Hor, 5,000 ft. high. These mountains are verdant, and in many parts cultivated, yielding good crops. Ruined towns and villages abound, attesting the former prosperity of the country. The numerous wadys, which come down from the mountains, generally contain streams sufficient to keep vegetation alive. One of these begins near the Akabah, leading by the back of the range to Petra, and thence to the

Dead sea. Along it there are traces of a Roman road. Another gives the most direct access from El-A. to Petra. After the discovery that a prolonged depression exists from Mt. Hermon to the Red sea many persons naturally assumed that the Jordan formerly flowed through its whole extent. But this theory is sufficiently disproved by the levels, imperfect as they are, which have lately been taken of the Jordan and the Dead sea. These have been found to be below the level of the gulf of Akabah and the drainage of the northern portion of El-A. is into the Dead sea, and that of the southern portion into the gulf.

ELA'IN. See OLEINE, *ante*.

ELAM, or SUSIANA, an ancient name of the mountainous district e. of Babylonia, stretching from India to the Persian gulf, including a low tract of fertile land in which are the marshes around the mouths of the Tigris and Euphrates. Its inhabitants were mostly nomadic. In certain portions it produces large quantities of grain. The chief city and capital was Shusan, or Susa.

E'LAND, *Antilope oreas*, a species of antelope, abounding in s. Africa, wherever there are fertile plains and low hills, except in the longest settled and most cultivated parts of Cape Colony, where it has been too much hunted to be any longer of very frequent occurrence. It is described by Livingstone as "the most magnificent of all antelopes." It is one of those which are sometimes called *bovine* antelopes, because they seem to approximate a little in some of their characters to the ox-tribe, having a broader muzzle, less slender limbs, and greater bulkiness of form than the antelopes in general. The E., however, is a very graceful and beautiful animal; it is as large as a horse, fully 5 ft. in height at the shoulder, and weighs from 7 to 9 cwt. The horns—which in the male are about a foot and a half long, and in the female longer and more slender—are almost straight, inclining backwards and outwards; they are pointed, and their great strength is increased by a spiral wreath. The E. has a large protuberance on the larynx, in this resembling the elk, from which, probably on this account, it has derived its name. It is also known as the *impoof* or *impoofoo*. Its tail very much resembles that of an ox, and terminates in a tuft of long black hair. It is a gregarious animal, and the herds are often large. It is generally very fat, and not difficult of pursuit, its gentleness also increasing the facilities of the hunter. Its flesh is very much esteemed, particularly the muscles of the thighs, which are dried like tongues. It is surprising that no attempt has been made to domesticate, for useful purposes, an animal very easy of domestication, and possessing so many valuable qualities.

Livingstone discovered a variety of the E. in regions to the n. of the Cape Colony, having the body marked with narrow white transverse bands. According to the figure given in his travels, it seems even more bovine in form than the common variety.

E'LANET, *Elanus*, a genus of *falconidæ*, allied to the kites, which they resemble in many of their characters; but from which they differ in having the short tarsi half covered with feathers, and the claws, except that of the middle toe, rounded beneath. The tail is very little forked. One species (*E. melanopterus*) is common in Africa, from Egypt to the cape of Good Hope, and is found also in India. Another species is the black-shouldered hawk (*E. dispar*) of America, the northern limit of which appears to be South Carolina. Both of these feed chiefly on insects, which they catch on the wing, but they also prey on small birds and reptiles.

ELAPS, a genus of venomous serpents, inhabiting the warm parts of the world, and chiefly the Indian islands, New Holland, and tropical America. They are of slender and cylindrical form, with an elongated head, and often of bright and beautiful colors. They are not very agile, are said to prey chiefly on other reptiles, and live among the luxuriant vegetation of meadows or of forests.

EL-ARAISH, or L'ARAISH (Fr. Larache), a t. in Morocco, on the Atlantic ocean, 45 m. s. of Tangier, well situated on a rocky height, and the seat of a military governor. It is one of the most frequented ports on that part of the coast. Pop. about 5,000.

ELASMOSAU'RIANS, gigantic marine saurians of the cretaceous epoch. One species had vertebræ nearly as large as those of an elephant. It was like a whale in bulk, with a long flexible neck, paddles short, tail serpent-like, skull light with a long flat muzzle with nostrils or spout-holes near the orbits, teeth sharp and well fitted for seizing fish. It reached 45 ft. in length. Its remains have been found, especially in New Jersey.

ELASTIC CURVE, according to James Bèrnoulli, the figure which would be taken by a thin horizontal elastic plate if one end was fixed and the other loaded with weights.

ELASTICITY, or SPRING. When an external force acts upon a solid body, it produces at first slight alterations in the relative positions of the particles; and if before these alterations exceed a certain limit, the force ceases to act, the particles return to their former position, and the disfigurement disappears. This power or property of recovering their previous form after alteration, is called E., and we are justified in ascribing it to all bodies, though in very different degrees. It was once believed that there were definite limits within which changes of form produced by pressure or other

forces disappeared completely. It was thought, for instance, that when a weight of no great magnitude is suspended from a metallic wire, the slight increase of length which the wire is observed to undergo, is completely lost when the weight is removed; and the limit to which the wire might thus be stretched, and still suffer no permanent increase of length, was called the limit of its elasticity. But recent more accurate experiments have shown that no such limits exist, at least in the case of metals; or, which is the same thing, that permanent lengthening results, however slightly the wire be loaded—it never contracts again quite so far as it was stretched. It is necessary, therefore, to fix the limit arbitrarily; and this is done by agreeing that it shall be held to begin when the metal in question suffers a permanent elongation of 0.00005 of its length. To get the elastic extensibility of a wire, then, we must compare its length suspended, with its length when the weight is removed. In this way it is found that the extensions produced are proportional to the extending forces or weights. From this law, then, we can calculate what weight it would require to stretch a wire or rod of a sq. in. in section to double its own length; supposing it possible to proceed so far without breaking it, and that the law of E. continued up to this point unaltered. This weight, which is different for every metal or kind of wood, is called the *co-efficient* or *modulus of elasticity* of the particular substance; and is used in mechanics in calculating how far a given weight will extend a wire or rod of given diameter. This co-efficient is not constant for the same metal; for all circumstances that increase the density of the metal, increase the modulus of elasticity. Bodies manifest E., not only when extended in length, but also when compressed, when bent, or when twisted. If an ivory ball be dropped from a height upon a marble slab smeared with fat and lampblack, when caught after the rebound, it is seen to have touched the marble, not in a point, but in a circle of several lines in diameter, and must therefore have lost for a time its spherical shape over that extent. In the same way the mark of a well-hit golf-ball is pretty broadly shown upon the face of a club after the stroke. The E. shown by wires and threads of glass when twisted, has been turned to account in the torsion-balance (q.v.), for measuring other weak forces. Steel, ivory, caoutchouc, etc., are well known for their elastic properties, to which they owe much of their utility.

The propagation of waves of sound through solid bodies depends upon their E.; and from observations of this kind made with different substances, the modulus of E. for each may be deduced; the results, however, differ slightly from those arrived at by attaching weights, owing to the heat produced by the vibratory movement.

All solid bodies are only imperfectly elastic—that is, they do not quite recover their form and volume when the disturbing force ceases. Liquids and gases, on the contrary, are perfectly elastic, or return exactly to their original bulk or volume when the pressure is removed. The elasticity of liquids and gases, however, acts only in expanding after compression, while that of solids acts also in contracting after extension. The expansive elasticity of liquids and gases is equal to the force used to compress them. Water and other liquids are easily seen to be compressible, by the fact of their conveying sound—a sound-wave being merely a *state* of compression, propagated from each layer of the liquid to the next. The coefficient of elasticity of water determined by Colladon and Sturm, from the velocity of sound in the lake of Geneva, agrees very well with that determined by direct measurements in Oerstedt's apparatus. The discovery of the compressibility of water is an English one, due to Canton, in 1763. Previous attempts, by Italian and Dutch philosophers, to compress water by hammering a silver shell filled with that fluid, had failed to give any certain result, as the water was forced through the pores of the metal. At a temperature of 50°, one atmosphere compresses water to about 0.999995 of its volume. From the existence of a maximum density temperature for water, some curious consequences arise with regard to the effects of pressure on the fluid. The volumes or bulks which a given quantity of any gas assumes under different pressures, are nearly in inverse proportion to the pressures. See MARIOTTE'S LAW. The elasticity of gases is usually measured by the height of the column of mercury that they sustain. The elasticity of gases is a force much and variously employed in the arts of life. See AIR-GUN, AIR-PUMP, GUNPOWDER, etc.

ELASTIC TISSUE, known also as yellow fibrous tissue, is one of the forms of fibrous tissue (q.v.). It derives its name from the remarkable physical property which it possesses of permitting its fibers to be drawn out to double their length, and again returning to their original length. It occurs in various ligamentous and other structures of the animal body in which elasticity is required, as, for example, in the vocal cords, the membranes connecting the cartilaginous rings of the trachea, the middle coat of the arteries, the skin, etc.

ELATE'A (anc. CITHÆRON), a mountain range in Greece, between Bœotia and Attica, frequently mentioned by the early poets. The highest peak is a little over 4,600 ft. above sea-level.

EL'ATER, a Linnæan genus of coleopterous insects, now divided into many genera, and forming the tribe or family *elateridæ*. They have a narrow elongated body; the head is in almost all cases inserted deeply into the thorax; a strong spine on the under part of the thorax at its base, fits into a groove; the legs are short, and rather slender.

They are generally found upon the flowers and leaves of plants, which are their food. When disturbed, they fold their legs and antennæ close to the body, and let themselves drop to the ground. If they fall on their back, or are placed on it, the shortness of their legs incapacitates them for obtaining another position by the means common to other insects; but they are enabled to do so by a violent muscular exertion, arching the body a little, and suddenly straightening it again, so that they fling themselves into the air with a jerk and a *click*. Hence the names click-beetle (q.v.) and SKIP-JACK. The spine and groove of the thorax are supposed to be of use in this. The larvæ are long, rather slender, with six feet near the head, and a tough skin. Many feed on rotten wood; others, wire-worms (q.v.), on the roots of plants. Many are British. Some of the *elateridæ* of tropical regions diffuse from spots on the thorax a strong and beautiful light, and are called fire-flies (q.v.).

ELATE'RIUM, a drug obtained from the fruit of the SQUIRTING CUCUMBER, or SPIRTING CUCUMBER (*ecbalium agreste*, formerly known as *momordica elaterium*), also called the wild cucumber, an annual plant of the natural order cucurbitaceæ, a native of the s. of Europe, common on rubbish in the villages of Greece and the archipelago. The whole plant is rough, with stiff hairs; it has a trailing branching stem, without tendrils; the leaves are heart-shaped, somewhat lobed and toothed, on long stalks; the flowers axillary, yellow, the male flowers in small racemes; the fruit oblong, about an inch and a half long, grayish green, covered with soft prickles, and finally parting from its stalk, and expelling its seeds along with a thin mucus through the aperture where the stalk was inserted. This remarkable phonomenon is ascribed to osmotic action within the fruit; a thin membrane separating a mucus which immediately surrounds the seeds from a less dense juice which abounds in the succulent part of the fruit, and the quantity of the former being gradually increased at the expense of the latter, till, on the perfect ripening of the fruit, the much distended central cell is opened, to permit its ejection. It is this mucus surrounding the seeds—a thick green mucus of a very peculiar character—which contains the elaterium. To obtain the drug, the juice of the nearly ripened fruit is allowed to stand for a short time, when it becomes turbid, and deposits a sediment. The sediment, carefully collected and dried, is elaterium. It is of a pale grayish-green color, light and friable, with an acrid taste, and a peculiar not unpleasant odor. It is an exceedingly powerful or drastic purgative, used chiefly in dropsies, and in very small often-repeated doses. It should not be used except under medical advice. It acts as an irritant not only on the eyes, if it comes in contract with them, but even on the fingers of those who handle it. Its properties seem to depend chiefly on a crystalline principle called *elaterin*. The use of E. was known to the ancients. A few acres of the squirting cucumber are grown at Mitcham, in Surrey.

ELATH, or ELANE (now AILAH), a t. in Idumea on the shore of the Elanitic gulf of the Red sea; the place where Solomon fitted out his ships for bringing treasures from Ophir. David captured it from the Edomites. It is an important point in the route between Medina and Cairo.

ELATMA. See JELATOM.

ELBA (Lat. *Ilva*, Gr. *Æthalia*), an island belonging to the kingdom of Italy, in the Mediterranean sea, between Corsica and the coast of Tuscany, from the latter of which it is separated by the channel of Piombino, a strait 5 m. in breadth. Its greatest length is about 18 m., and its breadth varies from 3 to 10 m., this irregularity being caused by indentations both on its northern and southern shores. Its area is about 90 sq. miles. The coast is bold and precipitous. The surface is traversed from w. to e. by a chain of mountains, which divides into two spurs at the eastern extremity of the island; the highest summit, Monte della Capana, attaining an elevation of 3,600 ft. above sea-level. These mountains are for the most part bare; but on their lower ridges, and in the valleys, the vine, olive, mulberry, and other trees flourish. The climate, except in the low-lying districts on the shore, is temperate and healthy. There are few streams in E., but it has numerous wells. The principal products are wine, white, red, and sweet, and of good qualtity; wheat, Indian corn, vegetables, and water-melons. Fifty thousand cwts. of salt are produced annually from the salt-pans on the shore. Sheep, goats, pigs, and asses abound, but horned cattle and horses are scarce; the coasts supply fish plentifully. Iron of excellent quality is obtained from a mountain in E., 2 m. in circumference, and 500 ft. in height. This hill, which stands on the e. coast, is almost entirely a mass of ore, and so rich that it yields from 50 to 75 per cent. E. also yields loadstone, alum, vitriol, and marble. Porto Ferrajo, the capital and residence of the governor, has a population of about 4,000. E. has been rendered famous in history from having been Napoleon's place of exile from May, 1814, till Feb. 1815. Pop. about 22,000.

EL BASSAN, ALBASSAN, or ILBASSAN, a t. of European Turkey, in the province of Albania, on the Scombi, 35 m. e. from the mouth of the river. It stands in a fertile plain, surrounded by mountains, is the capital of a sanjak, and the seat of a Greek bishop. It has manufactures of iron and copper wares. Pop. 10,000.

ELBE (called by the Romans *Albis*—i.e., white—and by the Bohemians *Labe*) an important river of northern Europe. It originates in the confluence of numerous

streams which rise at the south-western base of the Schneekoppe (Snowcap), one of the highest summits of the Riesen-Gebirge, a mountain-range on the northern border of Bohemia. The course of the E. begins near lat. 50° 45′ n., long. 15° 36′ e.; at an elevation of about 4,400 ft. above sea-level. Its total length, including windings, is estimated at from 700 to 720 m. and its basin at 56,000 sq. miles. The average depth of the E. is 10 ft., and its mean breadth 900 ft., although occasionally it has a width of upwards of 1000 ft., and at its mouth of several miles. In the course of its progress to the sea, it is joined by 17 rivers and upwards of 70 streams. From the base of the Schneekoppe, it flows s. to Pardubitz, whence it proceeds w. to Brandeis, and afterwards in a general n.w. direction past Melnik, Leitmeritz, Aussig, and Tetschen, where it quits the Bohemian territory, and enters Saxony. At this point, it is 355 ft. wide. Its principal affluent in Bohemia is the Moldau. On its course n.w. through Saxony, the E. passes Pirna, Dresden, and Meissen, and entering Prussian Saxony, about 7 m. above Mühlberg, it advances to Rorgau and Wittenberg, from which point it flows first w., then n.w. to Magdeburg, receiving in its progress the Mulde and the Saale, both from the left. From Magdeburg flowing n.e., the E. arrives at the border of Brandenburg, receiving the Havel from the right; then turning n.w., it forms the boundary between Prussian Saxony and Brandenburg, and enters Hanover, through which it flows for upwards of 30 miles. Then still flowing n.w., it forms the boundary of Lauenburg, the Hamburg territory, and Holstein on the n., and Hanover on the s., until it empties itself into the North sea at Cuxhaven, where it attains a breadth of upwards of 10 miles. At this point, the tide rises 12 or 13 feet. The E. is divided into several branches between Hamburg on the n., and Harburg on the s., by the numerous islands that there interrupt its course. Vessels of 14 ft. draught can at all times ascend to Hamburg. The scenery of the valley of the E., although generally pleasing, is not remarkable in any portion of its course, except that which extends between Aussig and Dresden. Between these two towns, the course of the E. is generally between bold cliffs, and high natural battlements of rock; the banks covered with foliage, wherever a tree can support itself; and occasionally varied by a strip of green glade. It has been said that here the E. has all the variety of the English Wye, on a scale nearly as majestic as that of the Rhine. Its waters are stocked with abundance of highly esteemed fish; beavers likewise build in the stream. Steam-boats ply from Dresden up the river, and down as far as Torgau, as well as from Magdeburg to the sea. The navigation of the E. was formerly impeded by all manner of imposts and monopolies; and, what was quite as bad, sand was allowed to accumulate, so that vessels were often obliged to wait three or four weeks for want of sufficient water. The former of these impediments has of late years been gradually removed, till in 1870 all then existing tolls were abolished, but something still remains to be done towards improving the channel.

ELBERFELD, one of the most important manufacturing towns in Germany, is situated on both sides of the Wupper, an affluent of the Rhine, 16 m. e.n.e. of Düsseldorf. Its site, in the narrow and hill-girt valley of the Wupper, is picturesque and healthy. The old parts of the town are poorly built, straggling, and irregular, but the more recently erected portion is well built, with numerous spacious and imposing buildings, in a high architectural style. E. is chiefly famous for its dyeing, bleaching, and printing establishments, also for its extensive and important manufactures of cotton, silks, tapes, ribbons, merinos, fancy woolen goods, velvets, etc. Bleach-fields occupy a great part of the envirous of E., and of the banks of the Wupper, the waters of which are said to possess very valuable bleaching properties. At E., the well-known dye, Turkey red, is imparted to yarns, at a cheaper rate, and with more clearness and firmness of color, than at any other town in Europe. The patterns for the printed goods are designed at Elberfeld. E. supports, amongst its numerous educational institutions, an important establishment, in which young manufacturers and overseers are taught the management of the Jacquard-loom, pattern-drawing, etc. Like the rest of the Wupper valley, E. is notable for religious zeal and orthodoxy. Pop. '40, 31,500; '75, 80,599 (mostly Protestants). E. is connected by a tramway with the neighboring town of Barmen (q.v.), also the seat of extensive manufactures.

ELBEUF, or ELBŒUF, a manufacturing t. of France, in the department of Seine-Inférieure, is delightfully situated in a picturesque valley on the left bank of the Seine, about 75 m. n.w. from Paris. It was originally badly built, but it has recently been greatly improved. Large factories also have arisen rapidly; and a spacious market-place (*champ de foire*), adorned with rows of chestnut-trees, has been erected. The two principal public buildings of E. are the churches of St. Etienne and St. Jean-Baptiste, both containing fine specimens of richly painted glass. The factories of E. and the vicinity exceed 200 in number; these are for the most part worked by steam-power, and give regular employment to more than the half of the population. The manufactures are principally double-milled and waterproof cloth, flannel fabrics, billiard table-covers, and light woolens of every color and description. E. has active steam communication with Paris, Havre, and Rouen. The pop. in 1876 was 21,935. E., which has been called the Leeds of France, had 80 cloth manufactories as early as the 16th century. In consequence of the revocation of the Edict of Nantes, the greater number of the cloth manufacturers emigrated; and it was not till after the revolution

of 1789, and more particularly since the separation of Belgium and France, that industry again began to flourish.

ELBERT, a co. in n.e. Georgia, on the Savannah river; 514 sq.m.; pop. '70, 9,249—4,863 colored. Surface hilly, with much forest land; soil fertile, producing corn, cotton, etc. Co. seat, Elberton.

ELBERT, SAMUEL, 1743–88; b. S. C.; served in the revolutionary army, rising to col. In 1785, he was elected governor of Georgia.

ELBING, a considerable trading and manufacturing t. in West Prussia, is situated in the midst of a fertile valley, on the navigable river of the same name, 34 m. e.s.e. of Danzig, and 5 m. s. of the s.w. extremity of the Frisches Haff, into which the Elbing flows. It is connected by a canal with the Nogat, the eastern arm of the Vistula. The town was formerly surrounded with walls and mounds, of which, however, there are now but few remains. Of the numerous churches, the most remarkable is the Marienkirche, erected in the 14th century. The gymnasium, founded in the year 1536, contains the town library, consisting of 24,000 volumes. There are likewise several well-conducted educational and charitable institutions. The manufactures are chiefly linen and cotton cloths, leather, tobacco, soap, and chicory. There are also oil manufactories, iron foundries, breweries, dye and print works. E. was founded about the beginning of the 13th c., by colonists from Lübeck and Bremen, who settled round the fortress erected by the German knights. After various vicissitudes, it was annexed to Prussia in 1772, and after a period of decline, has again risen to a thriving condition. The larger vessels unload at Pilau, which serves as the harbor of Elbing. Pop. '75, 33,572.

ELBOW. See ARM.

ELBOW-PIECES, in armor, or *coudières*, were the metal-plates used to cover the junction of the rere-brace and vant-brace, by which the upper and lower half of the arm were covered. They increased to an enormous size, as in the effigy of sir Thomas Peyton, in Isleham church, but again decreased to their normal size. An *elbow gauntlet* was a gauntlet of plate reaching to the elbow, adopted from the Asiatics in the 16th century.—Fairholt's *Costume in England*, p. 494.

ELBURZ', a lofty mountain-range that runs longitudinally along the entire southern border of the Caspian sea. It frequently divides itself into subordinate parallel ridges, inclosing extensive and fertile valleys, many of which are well inhabited and carefully cultivated. Demavend (q.v.), said to be 21,000 ft. in height, is one of the highest summits.—ELBURZ, or ELBRUZ, is also the name of one of the summits of the Caucasus, 18,500 ft. high.

ELCHE (anciently, *Ilice*, or *Illice*), a t. of Spain, in the province of Alicante, and 16 m. s.w. of the town of that name, is picturesquely built on both sides of a steep ravine, near the Elda, a tributary of the Segura, and about two leagues from the sea. It has an oriental appearance. The climate is eastern, winter is unknown, and around the town rises a huge encircling plantation of palms; the Arab alone is wanting to complete the likeness to an eastern city. E. is a flourishing town, is well built, its streets in general are wide and clean, and it has numerous squares and public walks. The church of Santa Maria is an imposing edifice, with a large dome, five gates, a famous organ, and a tabernacle made of precious marbles. The dates gathered from the palm plantation around E. are exported from Alicante; they are not so good as Barbary dates, though sold as such. Its manufactures are linens, woolens, cottons, brandy, wine, cigars, oil, soap, etc.; in these articles, and in cattle, rice, and wool, there is a considerable trade. Pop. about 18,500.

EL'CHINGEN, a village of Bavaria, on the left bank of the Danube, about 8 m. n.e. of Ulm. It is noteworthy as the scene of a battle fought on the 13th Oct., 1805, between the French under Ney and the Austrians under Laudon, in which the latter were defeated. Ney's victory obtained for him the title of duke of Elchingen.

ELCHO, FRANCIS WEMYSS-CHARTERIS-DOUGLAS, Lord, b. Aug. 4, 1818, is eldest son of the eighth earl of Wemyss. This ancient Scottish family has a traditional descent assigned it from the house of Macduff, earl of Fife. Sir Michael de Wemyss in 1290 was sent to Norway by the lords of the regency in Scotland to conduct the young queen Margaret to her dominions. He swore fealty to Edward I. in 1296, and was a witness to the act of settlement of the crown of Scotland by king Robert I. at Ayr in 1315. From him lineally descended Sir John Wemyss, who was created a baronet in 1625; raised to the peerage of Scotland as baron Wemyss of Elcho in 1628; and advanced to the dignities of earl of Wemyss in the county of Fife, and lord Elcho and Methel, in 1633. Although indebted for his honors to Charles I., he was engaged during the subsequent civil wars on the side of the parliament. David, fourth earl, was appointed by queen Anne lord-high-admiral of Scotland, and one of the commissioners for concluding the treaty of union. The eldest son of the fifth earl having taken part in the rising of 1745, escaped to France after the battle of Culloden, and was attainted. At his death, the family honors were taken up by his brother Francis, sixth earl, who, having inherited the estates of his maternal grandfather, col. Charteris, of Amisfield, co. Hadding-

ton, had assumed the surname of Charteris before that of Wemyss. Francis, his grandson, became heir to the titles of earl of March, viscount Peebles, and baron Douglas of Neidpath, on the demise of William, third earl of March, and fourth duke of Queensberry, in 1810. In 1821, he was made baron Wemyss of the United Kingdom, by which title the possessor of the earldom holds his seat in the house of lords. A parliamentary reversal of the attainder of lord Elcho, obtained in 1826, put beyond question the succession to the Scottish honors. His son, the present earl, is lord-lieut. of Peebleshire and lieut-gen. of the royal archers.

Lord E. was educated at Christ Church, Oxford, where he graduated B.A. in 1841. He was returned to the house of commons as M.P. for East Gloucestershire from July, 1841, to Feb., 1846, and has sat for Haddingtonshire since 1847 to the present time. He took his seat on the conservative benches, but accepted office, with other members of the party of sir Robert Peel, in the coalition government of the earl of Aberdeen, and was a lord of the treasury from Jan., 1853, to Feb., 1855. In 1859, the menacing attitude of France, and the periodical recurrence of seasons of alarm, caused by the unprotected state of our shores, and the possibility of invasion, led to an organization of rifle volunteers in Great Britain. In this movement, lord Elcho took the earliest and most prominent part. He organized a regiment of London Scottish volunteer rifles, of which he was appointed maj. in 1859, and lieut.-col. in 1850, and went to Hythe barracks to receive instruction in the use of the Enfield rifle, and to the camp at Shorncliffe, in order to become familiarized with regimental duties and brigade movements. Lord Elcho also projected the national association for the promotion of rifle-shooting, the first shot at which was fired by her majesty, July 2, 1860, at Wimbledon. He and other patriotic noblemen and gentlemen associated with him in the volunteer movement, had the satisfaction of assisting, in 1860, at two grand reviews by the queen of various brigades of volunteer rifle corps—of 20,000 men in Hyde park, and 22,000 men in Edinburgh. The war office assisted in organizing the force, and thus was consolidated the volunteer army of Great Britain, who adopted as their motto "Defence, not Defiance." The national rifle association, mainly under the auspices of earl Spencer and lord E., has become an established institution—the center and keystone of the volunteer movement. Lord E. has since given additional efficiency to the volunteer movement by watching, in his place in parliament, its financial relations with the government. In 1865, lord E. took a more active part in parliamentary politics than had been possible during his labors in promoting the volunteer movement. He spoke against the £6 franchise proposed by Mr. Baines, and gave notice of a motion for a royal commision to examine into the extension of the franchise. When the government of earl Russell brought in the reform bill of 1866, lord E. organized a secession from the Whig party, under the leadership of earl Grosvenor, which was nicknamed the "Cave of Adullam," but which succeeded in defeating the bill, and displacing the government. Lord Derby, on his accession to the premiership, offered a post in his government to lord E., but the offer was declined. In 1867, his party found themselves powerless to prevent the passing of a more democratic reform bill than that which in the previous year they had thrown out. Lord E. is a fluent and pleasant speaker, and he is exceedingly popular with the volunteers both of England and Scotland. Lord E. is an LL.D. of Edinburgh univesity. In 1871, he published *Letters on Military Organization*. In 1875, he drew public attention to the military organization of Great Britain.

ELDER, *Sambucus*, a genus of plants of the natural order *caprifoliaceæ*, consisting chiefly of shrubs and trees, with pinnate leaves, small flowers of which the corolla is wheel-shaped and 5-cleft, and 3-seeded berries. The wood of the young shoots contains a very large pith. The species are very widely distributed.—The COMMON E. (*S. nigra*), the *bourtree* of the Scotch, is a native of Europe, the n. of Asia, and the n. of Africa. It is found in all parts of Britain. It is a very large shrub, sometimes a small tree, with rather large leaves, and large terminal cymes of cream-colored flowers, which are followed by small black—or rarely whitish—berries. Its leaves and young shoots diffuse a narcotic ordor, and it is said to be dangerous to sleep under its shade. The inner bark has a bitter acrid taste. The leaves possess the same properties in a rather milder degree. The flowers have a peculiar sweetish and rather sickening smell, but are much used for making a distilled water—*elder-flower water*—which has a very agreeable odor, and is employed both in perfumery and confectionery. Distilled with water alone, they yield a volatile oil, which, on cooling, assumes a buttery consistence. A popular cooling ointment is made by boiling them in lard. They are also used for imparting a flavor to currant-wine and jelly, being added at the time of a slight fermentation which takes place in the spring of the year, after the currant-wine is made; and a wine is made from them which in scent and flavor resembles Frontignac. The clustered flower-buds are pickled, and used like capers. A grateful wine, well known in England, especially about Christmas, is made from the berries; and in some parts of Kent there are large plantations of E. to supply the London market for its manufacture. It is generally drunk hot or *mulled*. The berries are subacid and sweetish, with a rather unpleasant flavor. A rob made from them is a gentle aperient, diuretic, and sudorific, easily administered to children. In some parts of Germany, the poorer people use them as an ingredient in soups. They are said to be used to no small extent in England in the

adulteration of port wine, and the manufacture of spurious port wine.—The wood of the E. is yellow; that of old trees is very hard and tough, takes a fine polish, is used by turners, and as a substitute for box-wood in making mathematical instruments and other articles. Tops of fishing-rods are sometimes made of it. The pith of the young shoots, being very light, is generally used to make pith-balls for electrical experiments. Toys for children are also made of it; and few boys are unacquainted with the use of E. branches, from which it has been expelled, for making pop-guns. The E. is very useful as a screen fence near the sea and in other exposed situations, as it grows with remarkable vigor, and makes great shoots, the destruction of the more tender and less matured parts of which in winter only tends to make it more bushy and useful for shelter. It is readily propagated by portions of its shoots stuck into the ground.—The SCARLET-FRUITED E. (*S. racemosa*), a native of the s. of Europe and of Siberia, much resembles the common E., but has softer and more herbaceous shoots, remarkably large buds, which are conspicuous in winter, and racemes of greenish-white flowers, which are followed by scarlet berries, the racemes of ripe fruit having much the appearance of beautiful pieces of coral. It is a frequent ornament of shrubberies in Britain, and when in full fruit, is almost unrivaled in beauty, but more frequently produces its fruit in cold districts than in those where the milder winter induces it to flower before the spring frosts are over. The juice of its berries is a powerful sudorific.—The DWARF E., or DANEWORT (*S. ebulus*), is a rather rare British plant, a coarse, herbaceous plant, with fetid smell. The *inner bark* has been employed in dropsical complaints as a hydragogue cathartic, and is given in the form of a decoction prepared by boiling down 1 oz. of the bark in 2 pints of water till the whole is concentrated to 1 pint. The dose is about 4 fluid ounces. In smaller quantities, it is useful as an aperient in certain chronic disorders. The *flowers* are white when freshly plucked, but become yellow in drying, and consist of a volatile oil, certain gummy, resinous, albuminous, and saline matters, and are stimulant and sudorific. They are employed in the preparation of *elder-flower water* by adding 2 gallons of water and 3 ozs. of rectified spirit to 10 lbs. of the flowers, and distilling off about 1 gallon. It is a good perfume. *White elder ointment* is procured by boiling equal weights of lard and elder flowers, and pressing through a cloth. It has an agreeable odor, and is employed as a cooling application to surfaces which are irritable. When the berries are expressed, they yield a purple juice named *elder rob*, which, when diluted with water, is useful in inflammatory and febrile complaints as a cooling drink. It contains malic and citric acids, sugar, gum, etc.

ELDER, an office-bearer in Presbyterian churches. The name is an exact translation of the Greek *presbyteros*, which occurs frequently in the New Testament, and from which the English word *priest* is derived. That the *presbyteroi* of the churches of the apostolic age were not *priests* in the special sense of that word, in which it denotes a person appointed to offer sacrifice on behalf of others, and to appear for them before God, is admitted by Protestants in general; but there remains much division of opinion as to the precise meaning of the term, and the bearing of the passages in which it occurs on the subject of church government. See BISHOP, INDEPENDENTS, and PRESBYTERIANISM. All are agreed, indeed, that *bishops* and all pastors of congregations are included among *elders* in the Scriptural use of the term; but the ordinary use of it is now limited to Presbyterian churches, and in them it has become the usual designation of the office-bearers associated with the minister of each congregation in the care and oversight of the flock. The argument for this class of office-bearers will be found briefly stated in the article PRESBYTERIANISM. They exist in the greater number of the churches of the reformation; and even in the church of England, bishop Burnet states that their introduction was only prevented by queen Elizabeth's dislike to a proposal, in which, with Burleigh and others of her advisers, she saw danger of an abatement of her prerogative, "since, if the concerns of religion came into popular hands, there would be a power set up distinct from hers, over which she could have no authority." In some Protestant churches, elders are appointed only for a certain term of office; but more generally it is until death, resignation, removal from the bounds of the congregation, or deposition. The appointment of elders takes place variously: in the established church of Scotland, they have generally been nominated by the kirk-session (consisting of the minister and elders); in the other Presbyterian churches of Britain and America, they are elected by the congregation. In most of the churches of the continent of Europe, which have any kind of connection with the state, there is some regulation of the civil law or of the civil authorities in this matter. The ordination of elders takes place in the congregation, but usually without imposition of hands; a difference between the mode of ordination of elders and ministers for which it is not easy to account, and which has certainly tended to produce a general impression that a greater difference of office subsists than the advocates of Presbyterianism admit. In the established church of Scotland, the elders have very generally discharged the functions of deacons (q.v.), at least as much as those which, according to the theory of Presbyterianism, belong to their own office, an example which, until recently, was almost universally followed in other Presbyterian churches. According to the *Second Book of Discipline* of the church of Scotland, it is the duty of elders to watch over the spiritual welfare of the people, to admonish, to visit the sick, to assist in the examination of persons seeking admission to the Lord's table,

etc. Elders, along with ministers, compose all the courts or assemblies of the Presbyterian churches, and have equal votes on all questions.

ELDON, BARON, Lord High Chancellor of England. John Scott, better known as lord Eldon, was b. 4th June, 1751, in Love lane, Newcastle, of obscure but respectable parents. William Scott, his father, began life as an apprentice to a "fitter," a sort of water-carrier and broker in coal; later in life, he became a "fitter" himself, and kept a public-house near the quay, to supply drink to his keelmen on the truck-principle; he engaged also in speculations in shipping and marine insurance. By his various occupations he became wealthy, and died worth about £20,000. John Scott's mother was a daughter of a Mr. Atkinson of Newcastle, and to her, lord Campbell, in his *Life of Lord Eldon*, traces the talent inherited by her sons William and John. William became baron Stowell, and was the head for many years of the high court of admiralty. See STOWELL, BARON.

John Scott was educated under the Rev. Hugh Moises, at the grammar-school, Newcastle, and as a boy gave no promise of his subsequent splendid career. On finishing his education under Mr. Moises, he, on 15th May, 1766, entered University college, with a view to the church; the following year he obtained a fellowship, and in the summer of 1771, won the prize for the English essay, but did not otherwise distinguish himself. A clandestine marriage, into which he entered with a Miss Surtees in 1772, nearly ruined him; however, by the advice of his brother, he returned with his wife to the university. Here, during the year of grace, he lived on his fellowship and gains as a private tutor; and the year expiring without a church living falling vacant, he betook himself to the study of law. In 1776, he was called to the bar. By this time, his wife's friends had become reconciled to her, and made her some provision; and by the death of his father, in the year of his passing at the bar, E. found himself in possession of £3,000. On his own and wife's money, he found he could just manage to live, and so settled on the northern circuit. His success on his first circuit was not great; but in his second year his prospects, through the aid of his brother and friends, began to brighten. It was not, however, till 1780, that prosperity could be said to have dawned upon him. A happy chance then occurred of showing both his talents and powers of work. The result was speedy affluence. Business poured in upon him; and by 1787, his practice at the equity bar had so increased, that he was forced to give up the eastern half of his circuit.

With success in his profession, E.'s ambition expanded, and he became political. A silk-gown, and then, through the favor of lord Thurlow, a seat in parliament, were but steps toward knighthood and the post of solicitor-general conferred on him by Pitt. From this point, his progress was secure, and effected much in the way in which political lawyers usually succeed. In 1793, he became attorney-general. In 1799, the office of chief-justice of the court of common pleas falling vacant, his claim to it was not overlooked; and after 17 years' service in the house of commons, he entered the house of peers as baron Eldon. In 1801, on the formation of the Addington ministry, E. ascended the woolsack—a post given to him nominally because of his great anti-Catholic zeal, but really because of his part in the intrigue which ousted his old patron Pitt from office. From this time till 1827, with little intermission, E. continued to occupy the woolsack under successive governments. He was in succession chancellor under Addington, Pitt, and lord Liverpool; and when, after the two brief administrations of Canning and Goderich, the duke of Wellington constructed a cabinet, E. again expected the woolsack, and resented his non-appointment to it. His love of office indeed continued to the last, and in 1835, we find him actually in hopes of office under Peel. In 1834, he ceased to speak in parliament. In 1821, E. was made an earl by George IV.; and in the same year, his brother William was raised to the peerage under the title of lord Stowell. In 1831, he lost by death his wife, his "beloved Bessy." His brother William died in 1836. He himself, after outliving almost all his immediate relations, died in his 87th year, Jan. 3, 1838, leaving behind him a fortune of over half a million sterling.

E. is said to have been a man of very winning and courtly manners, and of a handsome, prepossessing appearance. In the circle of his friends he is said to have been irresistible, and probably to the charms of his manner his success in life was somewhat owing. His career amply proves that he was a man of the greatest talent, sagacity, and power of managing men. He was undoubtedly a great lawyer, and his judgments, which have been much praised for their accuracy, fill a small library; at the same time, he took so long to arrive at them, that he has been charged with having caused more injustice by delay than worse judges by the iniquity of their decisions. For literature, as for art, he had no feeling, and the style of his decisions is generally detestable. He was a great drinker, though drink seems never to have unfitted him for work; and is said, when he went into retirement, to have spent his time over the newspapers and the gossip of old cronies, preferring their company to that of men of refinement and taste. Undoubtedly, the best of him is seen in his private relations. His love of and devotion to "Bessy" his wife was truly beautiful. As a public man, he is far from estimable. He was a great canter, whose life was a succession of intrigues and duplicities. He was no statesman: his one aim in politics was power, and his name is unassociated with even a single law intended purely for the public good. For forty years, he was a lead-

ing enemy of reform and religious liberty. The champion of the church, he never attended on public worship. Without political principles, his whole stock in trade, as a politician, was zeal against the Roman Catholics, which, however, proved enough, in the then state of society. He is said to have added parsimony to his other defects; but while various circumstances, besides the amount of the fortune which he accumulated, favor this charge, it is probable that his apparent parsimony rose out of habits formed in his family while he was yet struggling; and it is certain he was capable of generous actions. See Twiss's admirable book, *Public and Private Life of the Lord Chancellor Eldon; Life of Lord Eldon*, by lord Campbell; *Sketch of the Lives of Lords Stowell and Eldon*, by Dr. W. E. Surtees.

EL DORADO (the golden or rather the gilded land) existed originally in the imaginations of the Spanish conquerors of America, whose insatiable avarice loved to dream of richer rewards than those of Mexico and Peru. The Castilians found an imitator in sir Walter Raleigh, who twice visited Guiana in quest of this fabulous region. The name has at last made for itself an abiding-place beyond the furthest limits of Spanish possession. It indicates a co. in the n.e. of California, of which the capital, Calloma, stands near the spot where the first discovery of gold was made in that state. The district in question is drained by some of the northern feeders of the Sacramento, which empties itself into the bay of San Francisco.

EL DORA'DO, a co. in e. California, reached by the Sacramento and Placerville railroad, drained by branches of the American and the Cosumne rivers; 1872 sq.m.; pop. '70, 10,309—1582 Chinese. It is mountainous, and much of the surface is yet covered with forests of oak and pine. The Sierra Nevada mountains cross the e. part. In the low lands the soil is fertile; but gold-mining is the leading business. Co. seat, Placerville.

EL'EANOR OF AQUITAINE, 1122–1204, Queen of France and afterwards of England, was the daughter of William IX., the last duke of Guienne. She succeeded her father in 1138, and was married the same year to Louis VII. of France. Her lively and somewhat frivolous manners, and her love of pleasure, did not fit her for the society of a husband who was naturally austere, and who from religious conviction had adopted many ascetic habits. They became gradually estranged, and in the Holy Land, whither she accompanied him in 1147, their quarrels became so frequent and so bitter that at last a divorce was agreed upon, which, on their return to France, was completed under the pretext of kinship, 1152. Six months afterwards she gave her hand and her possessions to Henry of Navarre, who in 1155 mounted the throne of England as Henry II. That the duchy of Guienne should thus become permanently annexed to the English crown was naturally displeasing to Louis, and the indirect consequence of his displeasure was protracted wars between France and England. In other respects, the marriage had unhappy consequences. The infidelities of Henry, and the special favors he showed to one of his mistresses, so greatly aroused Eleanor's jealousy that she incited her son Richard to rebellion, and also intrigued with her former husband to get him to lend his influence to the great league formed against Henry in 1173. Her son had fled to Louis, and she was preparing to follow him when she was arrested and placed in confinement, where she remained till the death of her husband, 1189. As soon as he died she regained her liberty, and reigned as regent until Richard's arrival from France. She also held this position during Richard's absence in the Holy Land, for which he left in 1190. After his escape in 1194 from the captivity which befell him as he was returning home, she retired to the abbey of Fontevrault, where she died. There is a curious story told of Eleanor by Higden, monk of Chester, relating to one of Henry's mistresses known as "Fair Rosamond," of whom the queen was extremely jealous. Higden says: "She was the fayre daughter of Walter lord Clifford, concubine of Henry II., and poisoned by queen Eleanor, A.D. 1177. Henry made for her a house of wonderful working, so that no man or woman might come to her. This house was named Labyrinthus, and was wrought like unto a knot in a garden called a maze. But the queen came to her by a clue of threddle, and so dealt with her that she lived not long after." From *Encyclopædia Britannica*, 9th ed.

ELEATIC SCHOOL. The group of ancient Greek philosophers so called begins with Xenophanes of Colophon, who settled in Elea, a Greek city of lower Italy (whence the name), and includes Parmenides and Zeno, who both belonged to Elea, and also Melissus of Samos. The most flourishing period of this philosophy falls from 540 to 460 B.C. In opposition to the physical philosophy of the Ionic school, and to the doctrine of Heraclitus (q.v.), who denied all being or existence, the Eleatic philosophers made this conception of pure being, unmixed with all marks or properties derived through the senses, the foundation of all their speculations. As being, one and unchangeable, seemed to them to exclude all plurality and alteration of appearances, they gave up, with remarkable consistency, all attempts to explain scientifically the world as we see it; and the startling abruptness of their simple fundamental principle, taken in conjunction with the opposite doctrine of Heraclitus, was one of the chief causes that led Plato at a later period to attempt a reconciliation between the notions of *being* and *becoming*, or of absolute existence and phenomena.

ELEATIC SCHOOL, a sect of Grecian philosophers during the century preceding the Peloponnesian war, 530–430 B.C., deriving its name from Elea (or Velea), a city on the western coast of southern Italy, founded 540 B.C., by the Phocæans. The general characteristic of the school was the maintenance of a distinction between the apparent and the intellectual universe, between transient phenomena and everlasting truth. It includes the pantheistic idealism of Xenophanes and Parmenides, and the skeptical materialism of Leucippus and Epicurus. Consequently there are two divisions of the school. I. *The Eleatic proper;* II. *The Epicurean.* The former asserted the divine unity to be the origin and essence of all things; the latter confined its attention to the earthly and material side of the problem, not denying the immaterial and spiritual, but renouncing it as unattainable: the former disregarded the sensible elements, the latter the divine. But neither denied what it renounced. This article is concerned only with the former, or the Eleatic school proper. The shadowy character of its philosophy makes it difficult of determination, and only a few fragments of its writings remain. Its principal expounders must be taken as representatives of its different phases: 1. XENOPHANES, 618–522 B.C., of Colophon, in Asia Minor, emigrated to Sicily and perhaps to Elea. His philosophical views were given in his poem "On Nature," fragments of which remain, but not sufficient to afford a clear exhibition of the whole. He seems to have held an idealism obscure, imperfect, and conflicting. He adopted the conception of Pythagoras, that there must be an ultimate term of being which is not the visible universe but the divine intelligence. He denied that anything could have a beginning, or could become what it had not always been. But if nothing begins or becomes, then all things are an eternal unit. The unity of the Godhead is asserted against polytheism, and the individuality of the Deity against the dualism of conflicting forces. The substantial reality of the visible world is denied; God and the universe are made one. The divine essence is unchanging, eternal, infinite. The actuality of sensible facts is admitted; the reality of them is denied. They are shadows of the eternal. All things are incomprehensible, certain knowledge is impossible; the eternal and the divine are unintelligible and truth unattainable. Xenophanes anticipated geology, contributing to science the beginning of the modern investigations. He held to the periodical destruction of the world by water, as Parmenides, who followed him, did to its destruction by fire. With all the contradictions and errors of his system he is to be honored as among the first to introduce into Greek philosophy elevated conceptions of the grandeur, glory, and sovereignty of a divine intelligence. 2. PARMENIDES, born, probably at Elea, about 536 B.C., was a disciple of Xenophanes, to whose views he gave a more logical development. Fragments only of his own statements remain, which have to be supplemented chiefly from the attacks of his adversaries. Aristotle commends him for his clearness of thought, and asserts concerning him that, "looking up to the whole heavens, he declared the one only being to be God." Yet, in improving the forms of his system he perhaps injured its substance; for his starting-point seems to have been not the infinite intelligence, but the abstract conception of being. He shows clearly the conflict between the judgments of the senses and the conclusions of the reason. The essence of his scheme is the contradiction of entity and nonentity. What is cannot be non-existent; but everything that is exists. And, as nothing can proceed from non-existence to existence, all existence is eternal and unchangeable. All changes and motions are appearances only. Being is indestructible. In these speculations one cause of confusion and extravagance was the use of ambiguous and vague language. This defect showed the necessity of precise terms and of valid arguments. It thus prepared the way for logic. 3. ZENO, unquestionably a native of Elea, was the pupil, friend, and defender of Parmenides. His method of setting forth his views led to great changes in philosophy, among which were the questions of Socrates, the dialectics of Plato, and the organon of Aristotle. He is the inventor of regular logical methods, though Aristotle claims for himself that while his predecessors had provided only the forms of reasoning, he had created the art. But while Zeno gave greater clearness to the views of Parmenides by his logical precision, he also made their errors and dangers more manifest. He arrayed reason against experience, and led the way for the sophists. 4. MELISSUS, of Samos, though not directly connected with the Eleatic philosophers, is numbered among them, because of the similarity of many of his views. He confined his attention chiefly to the negative aspects of the system, denied the reality of visible things, and thought it inconsistent to ascribe time, change, or limitation to the solitary existence. He seems to have thought that knowledge of God is impossible: and in his conception of him, as Aristotle said, inclined towards materialism. The Eleatic school proper was thus verging towards the second or Epicurean branch. Imperfect and erroneous as it was, it nevertheless awakened men in that early age to consider the vanity of merely temporal things; exposed the fallacies of polytheism; affirmed the existence of a supreme Intelligence, omnipotent, omnipresent, infinite, and eternal; and called human reason to hold communion with the sovereign power in which all creatures "live and move and have their being."

ELECAMPANE, *Inula*, a genus of plants of the natural order *compositæ*, sub-order *corymbiferæ*, nearly allied to *aster*. The only important species is the common E. (*I. Helenium*), a native of damp meadows in the middle and s. of Europe, rather rare in Britain. This plant was formerly much cultivated for its root, which was used in

medicine, and still retains its place in the pharmacopœias, although comparatively neglected. The root has a faint aromatic odor; and a bitter, acrid, and somewhat camphor-like taste. It acts as a gentle stimulant to the organs of secretion, promotes expectoration, and is diuretic and sudorific. It contains a peculiar principle called *inulin*, which resembles starch, but is deposited unchanged from its solution in boiling water on its cooling, and gives a yellowish instead of a blue color with iodine; also another peculiar principle called *helenin*, or *elecampane camphor*, which resembles camphor in some of its properties.

ELECTION denotes, in theological language, the divine act by which certain individuals are chosen to salvation in Christ, and the doctrine of election is the doctrine of "God's everlasting purpose, whereby He hath constantly decreed by his secret counsel to deliver from curse and damnation those whom He has chosen in Christ out of mankind, and to bring them by Christ to everlasting salvation as vessels made to honor." These words, taken substantially from the articles of religion of the church of England, may be said to represent, in a moderate form of expression, the orthodox doctrine on the subject of election. Besides this form of the doctrine, there is a lower and a higher form of it, which, apart from technical and polemical language, may be said to spring—the one from the supposed subordination of the divine act or purpose to the divine foreknowledge of human conduct—the other from the exaltation of the divine act or purpose into an absolute and arbitrary supremacy, having no relation whatever to human will or conduct. The former of these extremes corresponds to the Pelagian or Arminian doctrine of election, the latter to the hyper-Augustinian or Calvinistic. The Arminian aims to condition or limit the absolute character of the divine act in redemption in some way or another; the Calvinist aims to give to this act the most arbitrary and irresponsible character. The one, while not altogether repudiating a doctrine of election, yet gives such prominence to the human conditions of the elective purpose, as (in the view of Calvinists) to destroy it altogether; the other maintains not only a doctrine of election or predestination, but also the correlative doctrine of reprobation. In the view of the Arminian, salvation is within the choice of the human will; in the view of the Calvinist, the human will is of little or no account—the decree of God is everything—and this decree (which Calvin admitted to be a "*decretum horribile*") absolutely determines some to everlasting life and some to everlasting death. The separation has its source in the will of God, and not in the moral conditions of mankind.

It is obvious, in the mere statement of such views, how audaciously theology has sought to settle questions beyond all human scrutiny and settlement. In the nature of things, the relations between the divine and human will appear indeterminable; and, notwithstanding all the labor of inquiry devoted to such subjects in the past history of opinion, it cannot be said that any advance of thought has been made regarding them. If the mere logic of the question be kept in view, the Calvinistic opinion has the advantage over the Arminian—setting out, as it does, from the recognition of the divine will as absolutely supreme, and the source, consequently, of all subordinate action—a thought which is in the highest degree logically consistent. But then the moral perplexities which arise out of the practical application of this view, and the ease with which it may be perverted into a fanatical and dangerous error, will always repel many minds from its adoption.

Although the expressions election, elect, etc., are frequent in Scripture, it cannot be said that what is known as the theological doctrine of E. was acknowledged by the Christian church till the time of Augustine. The Greek fathers confined their attention almost entirely to questions purely *theo*logical—that is to say, relating to the character and constitution of the Godhead. Gnosticism and Arianism, the two main forms of heretical opinion before Augustine, indicate the channels into which theological discussion had previously run. It was not till the Latin mind had taken up this discussion, that the more practical question of the relation of the divine and human will in redemption came to receive special attention. The controversy between Pelagius and Augustine in the beginning of the 5th c., brought out almost all the aspects of the question which have since, at successive epochs in the history of the church, risen into renewed prominence. The contests between the Scotists and Thomists in the 14th c., between the Arminians and Calvinists, and, within the Roman church, between the Jansenists and Molinists in the 17th c., are recurring expressions of the same radical conflict or divergency of opinion. The spirit of modern theology is adverse to the logical disputations engendered by such discussions, and finds its more appropriate and useful field of labor in the province of critical and historical inquiry.

ELECTION, in law, the choice between alternating and incompatible rights or claims; as when an insurance company, according to the terms of its policies, elects whether it will pay in cash for property insured and destroyed, or replace the same in kind and value. This right of alternative choice is of special importance in equity practice, in which instances are constantly occurring.

ELECTION, in politics, is the choice of public officers by popular suffrage, in distinction from "appointment" of those in a lower by those in a higher grade. Popular elections were not unknown in ancient times and in the middle ages. The system has had a slow development in England, and has been imitated and improved by other

countries. In the United States, elections are of three grades—1. Local or municipal; 2. State; 3. National. State elections are for executive and legislative, and sometimes for judicial officers. National elections are held once in two years for the choice of members of congress, and once in four years for the choice of electors of president and vice-president of the United States. Elections are also sometimes held for the adoption or rejection of state constitutions or of amendments of the same. The provisions for local, municipal, and state elections are made in each state by the legislature thereof. The arrangements of national elections are made in part by state and in part by the national authority, the latter being supreme within its sphere, defined by the constitution.

ELECTION COMMITTEE. See PARLIAMENT.

ELECTION LAWS. See PARLIAMENT.

ELECTION OF SCOTTISH PEERS. See PARLIAMENT, PEER.

ELEC'TORAL COMMISSION, the body of men provided for by act of Congress, Jan. 29, 1877, to settle certain disputed questions in regard to the electoral votes of several states in the presidential election of 1876. The commission was composed of 5 senators, chosen by the senate; 5 members of the house of representatives, chosen by that body; and 5 associate justices of the supreme court, 4 of whom were designated by the act of congress, and the fifth selected by the four. The senate at the time was controlled by the republican party, the house of representatives by the democratic party, and there was thought to be danger of civil commotion in regard to certain questions likely to arise in the counting of the electoral votes of the several states in presence of the two houses. In these circumstances, a majority of each of the two political parties in congress, acting in a spirit of patriotism honorable to themselves and the country, agreed to create a commission to be constituted as above described, to which should be referred for judgment and decision the question which of two or more conflicting certificates received from any state of the votes cast by the electoral college of such state for president and vice-president in the election of 1876 was the certificate provided for in the constitution of the United States: the judgment of said commission in any matters referred to it, unless set aside by the concurrent action of the two houses of congress, was to be final. The proposed law was thereupon enacted, and in conformity with an understanding between the two political parties, the senate appointed 3 republicans, and 2 democrats, and the house of representatives 3 democrats and 2 republicans as members of the commission. Of the 4 associates of the supreme court who were named in the law, 2 were understood to be democrats and 2 republicans; and these selected, as the fifth associate justice to serve with them upon the commission, Mr. Justice Bradley, a republican. The commission was constituted as follows: Justices Clifford, Strong, Miller, Field, and Bradley; senators Edmunds, Morton, Frelinghuysen, Thurman, and Bayard; and representatives Payne, Hawton, Abbott, Garfield, and Hoar. Justice Clifford, by seniority of appointment to the bench, was by law president of the commission. As the counting of the electoral votes in the presence of the two houses of congress proceeded according to custom, it was found that there were conflicting certificates from four different states—Florida, Louisiana, Oregon, and South Carolina; and the two houses were unable to agree in either case which certificate should be received as genuine. The certificates and accompanying papers were therefore successively referred to the commission, who proceeded to hear argument upon the questions involved. The result in each case was a decision of the commission, by a vote of 8 to 7—the vote following the exact line of party division in the body—that the certificate of the electoral votes cast for Hayes and Wheeler, the republican candidates for president and vice-president of the United States, was the certificate which contained the lawful electoral vote of said state, and that the other certificates were illegal and void. The republican senate concurred in this judgment in each case, while the democratic house of representatives dissented. The decision of the commission, therefore, according to the terms of the statute, became irrevocable, and the said electoral votes were counted accordingly; and Rutherford B. Hayes and William A. Wheeler were found duly elected, by a majority of one electoral vote, respectively president and vice-president of the United States for the term of 4 years, from the 4th of Mar., 1877. The controlling question before the commission was whether an electoral certificate being in form confessedly according to law, it was competent for congress or the commission to go behind the same and take evidence *aliunde* in support of alleged irregularities and frauds committed before such certificate was issued. Upon this question the democrats in congress and in the commission took the affirmative, while the republicans took the negative. The reasons of the latter for taking this ground were clearly set forth in the reports of the majority of the commission to the two houses in congress upon the matters referred to that body.

ELEC'TORS, in the German empire, were those great princes who had the right of electing the emperor or king. In the earliest times under the Carlovingians, the crown was hereditary; afterwards, Germany became formally an elective monarchy, but the election was practically almost limited to the reigning family. Under the emperor Charles IV., the right of election became limited to the holders of the highest ecclesiastical and civil offices, some of which gradually became hereditary, and connected with territorial principalities, as in the case of the Hohenstaufens and of the dukes of

Bavaria, Saxony, Suabia, etc. Thus there arose seven E., those of Mayence, Treves, and Cologne (as being the chief primates and chancellors of the empire), the E. of the Palatinate and of Bavaria long exercising the right by turns, and the E. of Brandenburg, Saxony, and Bohemia. From 1400 to 1708, the right was never exercised on the part of Bohemia, but otherwise no change took place from the middle of the 14th c. to the peace of Westphalia. By the peace of Westphalia, an eighth electorate was established, Bavaria and the palatinate being each allowed the full right; and in 1692, a ninth was added, that of Brunswick-Lüneburg, but not without resistance by the E. and states of the empire, so that the new electorate was not fully recognized till 1710. In 1777, the number was again reduced to eight, the elector palatine inheriting Bavaria. The E. held a high and very peculiar position in the German empire. The Golden Bull describes them as "the seven pillars and lamps of the holy empire." They had certain important rights and privileges. They were leagued from the year 1338 for the maintenance of their freedom of election against the pope. They had royal dignities, only not the title of majesty. The territories belonging to their electorates were indivisible.

The peace of Luneville, in 1801, made a great change in the German empire, and subsequent changes took place during the times of French ascendency, which issued in the dissolution of the ancient German empire. The title of E., used by the prince of Hesse-Cassel, an electorate which was added along with other new electorates in 1802, was the last relic of the old dignities, and was merely nominal even before 1866.

ELECTORAL CROWN, or, more properly, CAP, was a scarlet cap, turned up with ermine, which was worn by the E. of the empire. It was closed with a demicircle of gold, covered with pearls, and on the top was a globe with a cross on it, also of gold.

ELECTRA, daughter of Agamemnon and Clytemnestra, and sister of Iphigenia, Chrysothemis, and Orestes. Clytemnestra and her children were famous for their crimes and sorrows, and fill a large place in Greek poetry and drama. The *Electra* of Sophocles is one of the great dramas of antiquity. Electra married Pylades, the close friend of her brother Orestes, and became the mother of Medon and Strephon. Others of the name E. appear in Greek mythology.

ELECTRIC BELLS. The ringing of bells is not a recent application of electricity, but it is only a few years since electric bells have been placed in many public and private buildings instead of the well-known bell hanging arrangement with wires and cranks. We have not space here to discuss the merits of the two systems; suffice it to say that the use of electric bells is spreading, and that for the purpose of communicating at some distance these are the only kind available. The arrangement required to ring an electric bell, or system of bells, is simple. Some form of galvanic battery requiring little attention is placed in any convenient place, and from it an insulated wire with the necessary branches is conducted to the various rooms, thence to perhaps as many bells, and finally back to the battery to complete the circuit. Each single bell is rung in this way; beside it is fixed a break consisting of a small electro-magnet by which a spring is attracted and released in rapid succession as long as a thus continually broken current of electricity is passing. On this spring a small hammer or knob is so placed that it strikes the bell as it oscillates to and fro. In every room which communicates with a bell there is a "press-button" or little spring by which the current of electricity is put off or on as we may wish. It acts in the same way as if we were to cut the wire to stop the current, and then bring the ends of the wire together again to continue it and so ring the bell. It will continue to ring only as long as we hold the ends together.

ELECTRIC CLOCK. The regularity of the clock depends, as is well known, on the action of the pendulum, which is isochronous—that is, has the property, within certain limits, of describing long and short arcs in the same time. See PENDULUM. The pendulum, however, left to itself, would, in consequence of the resistance of the air, and of the spring on which it hangs, soon come to rest. An impulse must therefore be given it occasionally, to keep it going. This impulse need not necessarily be exactly the same, for though it might cause the pendulum to make a longer swing at one time than at another, the time of oscillation would not differ. In ordinary clocks, these impulses are given by a heavy weight, and are transmitted to the pendulum through the wheel-work of the clock. No moving power can be more steady than gravity, or less likely to tax the isochronism of the pendulum, but its action on the clock is limited by the distance through which the weight descends, so that the weight must be periodically wound up, to keep gravity in play. The trouble of winding, though small, still leaves room for the wish that a clock might be constructed going for long periods without external help. Such an instrument the E. C. professes to be; but an independent E. C. is not trustworthy as a timekeeper, and all that electric clocks are used for is to copy the time of a good gravity clock. This work the E. C. does to perfection. The E. C. was invented by Bain, an Edinburgh clock-maker, in 1840, and his ideas, though improved and modified, still form the basis of electric clock-making. In the ordinary clock, it is the clock that moves the pendulum; in Bain's clock, it is the pendulum that moves the clock. As the construction of the pendulum is the only part of it connected with electricity, we shall confine our notice to a general description of the pendulum action. To the lower part of the pendulum a bob is attached, consisting of a hollow bobbin of insulated copper wire. Wires from both ends ascend the pendulum-rod, and

are in metallic connection respectively with the two springs from which the pendulum hangs. Two magnets, or bundles of magnetic rods, are fixed at either side of the bob, and are of such dimensions that the hollow bob in its oscillation can pass a certain way over each without touching. The magnets have their like—e.g.—south, poles turned towards each other. The two springs of the pendulum-rod are in connection with the two poles of a galvanic battery. The wire connecting one of them is made to pass round by a break, worked by the pendulum-rod. When the pendulum is made to move, say towards the right, it shifts a slider, so as to complete the connection between the poles of the battery. The current thereupon descends one of the wires of the pendulum, passes through the coil of wire forming the bob, and ascends by the other. In so doing, it converts the bob into a temporary magnet, the s. pole towards the right, and the n. pole towards the left. In this way, the s. pole of the bob is repelled by the s. pole of the right-hand magnet; and its n. pole is attracted by the s. pole of the left-hand magnet, so that from this double repulsion and attraction, both acting in the same direction, the bob receives an impulse towards the left. Partly, therefore, from this impulse, and partly from its own weight, the pendulum describes its left oscillation; and when it reaches the end of it, it moves the slider so as to cut off the battery current, and then returns towards the right, under the action simply of its own weight. On reaching the extreme right, as before, it receives a fresh impulse; and thus, under the electric force exerted during its left oscillation, the motion of the pendulum is maintained. So long as the electricity is supplied, will the pendulum continue to move. The current required is exceedingly weak, and Bain considered that it could be sufficiently excited by a plate of copper and a plate of zinc sunk into the ground, and acted upon by the moisture usually found there. This earth-battery, as he called it, was expected to act steadily for years; but the result proved far otherwise, for the soil not unfrequently dried up, leaving no trace of electrical action. The imperfection of the battery has led to a strong prejudice against these clocks—stronger, certainly, than they merit. Practice has, however, established that a clock driven by an electric pendulum, under no control, is not to be trusted, and clocks of this kind, so far at least as this country is concerned, are entirely abandoned. The next important step in perfecting the E. C. was made by Lewis Jones (patented 1857). All his clocks are ordinary gravity clocks. The standard clock is not an E. C. at all, but its pendulum makes and breaks contact in the battery circuit which controls the copying clocks. These last, though driven by weights, have Bain's pendulums, and the currents transmitted by the standard clock keep them oscillating in exact accordance with it, so that the standard clock and copying clocks have their pendulums always at exactly the same point in their oscillations. The copying clocks are adjusted to keep nearly the time of the primary, and the margin of error is wholly removed by electric control.

There are now two rival systems of electric clocks in this country—one invented by Wheatstone, patented 1869, and "exploited" by the British telegraph company; the other invented by Ritchie, clock-maker, Edinburgh (patented 1872).

Wheatstone's primary clock is a gravity clock with a pendulum bob like Bain's, with fixed magnet or magnets coincident with the arc of the pendulum. When the bob is driven by the weights of the clock from the one end to the other, a current is induced in the coil of the bob, according to the well-known principles of magneto-electricity (q.v.). When the bob returns, a current is created in the opposite direction. The copying clocks or dials have a mechanism similar to Wheatstone's step-by-step telegraph, and each oscillation of the primary pendulum, by generating a current, drives them one step onwards. The pendulum of the primary clock, along with the magnets, is a magneto-electric machine driven by the weight of the clock, and moving all the copying clocks. The work the pendulum has to do, however, interferes with its isochronism, and hence the primary clock has to be kept under the control of a standard clock by an ingenious contrivance. Ritchie takes advantage of the important feature of Jones's system, viz., that of having a standard clock free from all electric impulses, an ordinary astronomical clock whose pendulum only makes and breaks contact in a galvanic circuit. Thus all the perfection of clock-making is fully utilized. The standard clock, as in Jones's system, is placed in circuit with the copying clocks. But here his system differs. Instead of having weights and a train of wheel-work in the copying clocks, he has simply a Bain's pendulum driving an escapement (also patented) similar to Bain's original clock. The mechanism is thus simple and cheap, and each clock has got in its pendulum a store-house, so to speak, of individual energy under electric maintenance and control, and cannot without a grave accident be put out of order. It is inferior to Wheatstone's system in having battery power to maintain. But this does not cost much. From 3 to 5 Daniell's cells will work a copying clock in any part of the same town, and need only to be renewed once in six months. Ritchie's system is in some respects more trustworthy than Wheatstone's. The delicate action of the step-by-step motion is liable to accidental derangement. Now Ritchie's sympathetic clock has a heavy pendulum, and can be used in public dials to withstand even the action of the wind on the hands. Again, there is no need of a magneto-electric clock and a standard clock. The standard clock does all. The perfect success of Ritchie's system has been proved in Edinburgh and elsewhere. In Edinburgh, several public clocks on the sympathetic system have been in action for some years, and have not varied a second. The success of Ritchie's system is much indebted to an invention of Edward Sang, by which the length of the suspend-

ing spring of the standard pendulum can be altered, and the rate of the clock regulated without stopping it. Ritchie in 1864 also patented a magneto-electric system which, however, he has never worked.

ELECTRIC COLUMN, or DRY BATTERY; invented by De Luc. It is formed by a great number of alternating disks of paper, silver leaf, and zinc leaf. When the air is very dry it will hardly work; but under ordinary atmospheric conditions it generates a feeble current.

ELECTRIC FISHES. See ELECTRICITY, ANIMAL.

ELECTRICITY, the name used in connection with an extensive and important class of phenomena, and usually denoting either the unknown cause of the phenomena or the science that treats of them. Most of the phenomena in question fall under the three chief heads of frictional electricity, galvanism, and magneto-electricity. The present article is confined to the first.

Historical Sketch.—Thales, about 600 B.C., refers in his writings to the fact that amber, when rubbed, attracts light and dry bodies. This was the only electric fact known to the ancients. The science of E. dates properly from the year 1600 A.D., when Gilbert of Colchester published a book, entitled *De Arte Magnetica*, in which he gives a list of substances which he found to possess the same property as amber, and speculates on magnetic and electric forces. He is the inventor of the word E., which he derived from the Greek word *electron*, amber. Otto von Guericke, burgomaster of Magdeburg, in his work *Experimenta Nova Magdeburgica* (1672), describes, among his other inventions, the first electric machine ever made, which consisted of a globe of sulphur turned by a handle, and rubbed by a cloth pressed against it by the hand. Hawksbee (1709) constructed a machine in which a glass cylinder, rubbed by the dry hand, replaced Guericke's sulphur globe. Grey and Wehler (1729) were the first to transmit E. from one point to another, and to distinguish bodies into conductors and non-conductors. Dufay (1733–45) showed the identity of electrics and non-conductors, and of non-electrics and conductors, and was the first to discover the two kinds of E., and the fundamental principle which regulates their action. Between the years 1733 and 1744, much attention was given in Germany to the construction of electric machines. Up to this time, notwithstanding the inventions of Guericke and Hawksbee, the glass tube rubbed by a piece of cloth which Gilbert first introduced, was used in all experiments. Böze, a professor at Wittenberg, taking the hint from Hawksbee's machine, employed a globe of glass for his machine, and furnished it with a prime conductor. Winkler, a professor at Leipsic, was the first to use a fixed cushion in the machine. The Leyden jar was (1746) discovered accidentally at Leyden by Muschenbroek; but the honor of the discovery has been contested also in favor of Cuneus, a rich burgess of that town, and Kleist, canon of the cathedral of Camin, in Pomerania. Franklin (1747) showed the electric conditions of the Leyden jar, and (1752) proved the identity of lightning and E. by his famous kite experiment. The last was performed with the same object about the same time, and quite independently, by Romas of the town of Nerac, in France. In 1760, Franklin made the first lightning-conductor. Canton, Wilke, and Æpinus (1753–59) examined the nature of induction. Ramsden (1768) was the first to construct a plate-machine, and Nairn (1780) a two fluid cylinder-machine. The electrophorus was invented by Volta in 1775, and the condenser by the same electrician in 1872. In 1786, Galvani made the discovery which led to the addition of the new branch to the science which bears his name, and which now far exceeds the older branch in extent and practical value. See GALVANISM. In 1787, Coulomb, by means of his torsion-balance, investigated the laws of electric attraction and repulsion. In 1837, Faraday published the first of his researches on induction. Armstrong, in 1840, designed his hydro-electric machine.

Fundamental Facts.—Under the head Conductors (q.v.) it is stated that bodies which do not conduct E., or non-conductors, are capable of electrical excitation from friction, and are, in consequence, termed electrics, and that conductors not so affected are called non-electrics. The *fundamental principles* of electricity are illustrated by the *electric pendulum*. A glass tube bent at right angles, so as to project horizontally, is placed on a convenient stand. On the hook in which its upper end terminates, a cocoon thread is hung, to the end of which a pith-ball is attached. The ball is thus doubly insulated by the glass and the silk thread. If a tube of glass be rubbed by a dry silk handkerchief, and brought near the ball, the ball is at first briskly attracted, and then as briskly repelled; and if the tube be then moved towards it, it moves off, keeping at the same distance from it. The ball being so affected, or charged, as it is called, a rod of shellac or of sealing-wax, after being rubbed with flannel, attracts it, if possible, more briskly than before, and again sends it off exactly as the glass had done. If the glass tube be now again taken up and rubbed a second time, if necessary, the ball will act towards it as it did towards the sealing-wax. The same series of attractions and repulsions would have taken place if we had begun with the sealing-wax instead of the glass tube. We interpret this experiment in the following way: When glass is rubbed with silk, and the silk removed, it is charged with what is called positive electricity. The ball is attracted by it, and becomes on contact also charged with positive E., and is then repelled. When sealing-wax is rubbed with flannel, and the flannel removed, it becomes charged with negative E., which is the counterpart of positive E., for it attracts the positively charged ball, and communicating its own E. to it, finally repels it. From

such an experiment as this, we conclude *that bodies electrified either positively or negatively, attract neutral bodies and bodies affected with E. of an opposite name to their own, but repel those affected with E. of the same name; and that E. can be communicated from one body to another by contact.* For positive and negative (written also + and −), the terms vitreous and resinous are also employed, as glass and resin are the typical substances from which they may be obtained. Contact is not the only way in which E. is communicated. We find, when we deal with larger bodies than the pith-ball of the experiment, and sometimes even with it, that the passage of a *spark* between two bodies without contact communicates the E. of the one to the other. The part played by the rubbers in the above experiment must not be overlooked. The silk handkerchief employed to rub the glass assumes the resinous or − electrical state, and the flannel rubber of the sealing-wax the vitreous or +. This cannot, however, be clearly shown, as the experiment is performed, for the rubbers are in each case tightly embraced by the hand, which neutralizes their peculiar electricity. We can perform our fundamental experiment in a way clearly to show this. Let us take for our rubbing and rubbed surfaces two india-rubber balloons inflated with air (such as children play with), and hold them tightly one in each hand. They may be in all respects perfectly alike. Let us then rub them briskly on each other, and then hold the rubbed sides closely together. On bringing the two in contact near the pith-ball, it remains indifferent to them; but if we pull them apart, and put one on each side of the pith-ball, the ball plays actively between them, being attracted and repelled by each in turn. The fact of no attraction occurring when the balloons are together, shows that in the rubbing both electricities are generated in equal quantities, for they neutralize each other when brought near; and the fact that the balloons must be separated proves that all electric phenomena take place in an electric field, with positive E. at its one termination, and negative E. at its other. The non-conducting nature of the india-rubber prevents the electricities finally neutralizing in contact, and disappearing by the hands when apart. It is also instructive that as force is exerted and work is done in pulling them apart, we have the equivalent of that work in the form of an electric field capable of doing work. The motion of the pith-ball, and the heating caused by the tiny sparks which charge it, are evidences of the truth of the statement. It is again worthy of note that both balloons appear exactly alike, and yet they assume opposite electricities. That there must be some difference may be drawn from the next paragraph.

In most cases of friction, the nature of the rubbing and rubbed surfaces determines the kind of E. which each assumes. Thus, if glass be rubbed by a cat's fur instead of silk, its E. is − instead of +. In the following list, each body, when rubbed by any one preceding it, is negatively electrified; by any one succeeding it, positively: cat's fur, smooth glass, linen, feathers, wood, paper, silk, shell-lac, ground glass. When two pieces of the same material are rubbed together, the colder or smoother becomes positively excited. Metal filings rubbing against a plate of the same metal determine − E. in themselves, and + E. in the plate. When a white silk ribbon is rubbed by a black one of the same texture, the white one becomes +. A plate of glass becomes + when a stream of air is directed against it from a pair of bellows. The friction caused by steam of high tension issuing from a narrow pipe develops electricities in the steam and pipe which depend on the material of the latter. This fact has been turned to advantage by Armstrong in the construction of a boiler electrical machine of immense power.

Induction.—Free E. has the power of inducing the bodies in its neighborhood to assume a peculiar electrical condition; this is exhibited in the following simple way: A brass cylinder, rounded at both ends, is insulated on a glass pillar. Two pith-balls, hung by cotton threads, are attached at either extremity. When a glass tube is briskly rubbed, and placed within a few inches of the end of the cylinder, the balls at each end diverge, showing that each pair is charged with similar electricities. When the glass tube is withdrawn, the balls hang down as before, so that the electrical excitement of the cylinder is merely temporary, and dependent on the proximity of the excited tube. If, while the balls are apart, a *proof plane*, consisting of a small disk of gilt paper insulated at the end of a glass rod, be made to touch the end next the tube, and then transferred to an electrometer, the E. is found to be −; if the same be done at the other end, it is +. The nearer end of the cylinder is thus induced by the + E. of the glass to assume the negative electric state; and as no − E. can be excited without as much + E., we find the other end positively electrified to the same extent. It appears, besides, from the positions taken up by them, that *both electricities observe the same attractions and repulsions as the bodies affected by them.* This action of the E. of the tube inducing in the cylinder this peculiar electrical condition, is called induction; and the cylinder in this state is said to be *polarized*—that is, to have its poles or ends like a magnet, each having its similar, but relatively opposite force. If the hand touch the cylinder, the balls next the tube diverge further than before, and the other two cease to be affected. In this case, electrically speaking, the cylinder is a portion of the ground, for the hand and body are conductors; the ground is thus brought nearer, more − E. appears, and the + E. is lost in the spark with the hand. The − E. is kept fixed in the part of the cylinder opposite the tube by the + E. of the latter; and when the hand is first removed, and then the tube, it causes the balls at both ends to diverge permanently. We thus see that E. can be produced and insulated in conductors by the action of free E. on them. The + E. of the further half of the cyl-

inder is as free and insulated as if no − E. existed within it. This is shown by placing a cylinder near the first, forming a continuation of it, as it were, without touching, when the second cylinder, under the induction of the + E. of the first, is thrown into the same state as the first. This second can induce the same state in a third, and so on. As the excited tube is withdrawn, the whole series return to their natural condition without being in any way permanently affected. The moment, however, it is again brought near, there is manifested at the further termination of the last a + E., which exerts the same influence there as if a portion of the E. of the tube had been actually communicated or transferred to it.

The air intervening between the tube and the cylinder is termed the *dielectric*, for it is through it that the electric action is propagated. In proof of this, we have only to place a cake of shellac between the tube and cylinder, when the polarity of the cylinder will rise higher than before, as would be shown by the further divergence of the balls; and if this or a similar experiment be conducted with sufficient care, we find that the inductive action varies in amount for each non-conductor. Induction, therefore, we have reason to conclude, is not the direct action of one body on another, but an action transmitted through, or possibly residing in, the medium between them. In further proof of this, Faraday, who was the first to examine the function of the dielectric in induction, has shown that the action takes place through air in curved as well as in straight lines, which implies the action of an intervening medium. The relative powers of different substances in facilitating induction, are termed by this philosopher *their specific inductive capacities*. The following table by sir W. S. Harris gives the specific inductive capacities of the more important non-conducting substances, taking that of air as unity: Air, 1.00; resin, 1.77; pitch, 1.80; beeswax, 1.86; glass, 1.90; sulphur, 1.93; shellac, 1.95; india-rubber, 2.8. All gases, whether simple or compound, have the same inductive capacity, and this is not affected by temperature or density. If a large plate of metal be placed between the glass tube and the cylinder, the polarization of the cylinder instantly vanishes, for the induction is diverted by it into the ground.

Theory of Induction.—Faraday, taking for granted that the dielectric is the essential medium of induction, suggests that the molecules of air and other dielectrics are conducting, but that they are insulated from each other. We have already seen that by induction, part of the E. of an insulated body can be in effect transferred to a surface at some distance from it, without any loss experienced by the exciting body. If, now, we could imagine a series of insulated cylinders diverging in all directions from the glass tube, we have reason to expect that the whole of the E. of the tube would be in effect transferred to their outer extremities without loss of E. to the tube. To prove that such would be the case, Faraday took a pewter ice-pail, 10½ in. high, and 7 in. in diameter, and insulated it, placing the outside of it in conducting connection with the knob of a gold-leaf electroscope. An insulated ball, charged with + E., was then introduced into it without touching. The pail was thus subjected to polarization, the − E. being on the inner, and the + E. on the outer surface. The divergence of the leaves increased as the ball was lowered, until it sunk 3 in. below the opening, when they remained steadily at the same points. The ball was lowered till it touched the bottom, and communicated its charge to the pail, when the leaves remained in the same state as before, showing that the + E. developed by induction on the outer surface was exactly the same in amount as that of the ball itself. He then altered the experiment so as to have four insulated pails inside each other, and the effect on the outmost pail was in no way altered. Here the action of the air between the pails was in effect the same as that of the pails themselves, and if the molecules of air were insulated conductors like these, they would have acted in no way different from what they did. The action of the molecules of air, in certain circumstances, appears to favor the idea that they are individually conducting. The discharge of E. by spark through the air, shows that they can be forced to act as conductors; and the currents which proceed from points highly charged with electricity, appear to indicate that they can be attracted and repelled like the pith-balls of our first experiment.

Conductors, according to this theory, are bodies whose molecules have the power of communicating their electricities to each other with great ease, whilst non-conductors are those whose molecules only acquire this power under great force. Wheatstone has shown, as we shall afterwards see, that facility of discharge is not perfect even in the best conductors, as time is needed for its propagation, and it has been found that the terminal laminæ of non-conductors between two charged plates become penetrated with opposite electricities, which indicates the slow progress of conduction. The molecules of conductors and non-conductors, therefore, have the same power of mutual discharge, but in very different degrees, so that a good non-conductor may be regarded as an excessively slow conductor.

Potential, Density, Tension, Capacity.—Some idea of the meaning of the word *potential* may be got from the following comparison. Suppose we have a supply of water with a certain head, to fill an elastic bag: when the water is admitted, the bag will swell till the elasticity of the bag is equal to the head of water, and then the flow will cease. The potential is the head of water or elasticity of the bag, so many feet high, or so many pounds per square inch. The capacity of the bag is usually the amount it holds, but capacity in an elastic bag is a shifting quantity, and we must use the term in this way

if we wish to compare the capacity of two elastic bags—viz., the ratio of the water it holds to the head that filled it. Thus, a bag holding 10 galls., with a head 1 ft., would have a 10 times greater capacity than a bag holding 10 galls. with a head 10 ft.; for if the first were pressed by a head of 10 ft., it would hold 100 galls., the resistance of the bag being supposed to increase with its contents. Now, let us take a somewhat similar electric problem. An insulated ball is connected with a magazine of energy, ready to make E. flow when occasion offers, such as a galvanic battery. Let the + pole of a gigantic battery be connected with the ball, and the other pole with the ground, E. will flow to the ball till the air between the ball and the ground presents an electric reaction equal to the potential of the battery. The charge of the ball taken with reference to this potential gives the capacity of the ball. So much, then, for a popular view of these two words. The potential of a body, or any point in the field, is defined thus—viz., *the amount of work that would be expended in bringing a small quantity, a unit of + E., from an infinite distance to the body or point.* If the body is positive, the work would be expended; if negative, the work would be done on the body and the potential −. The said unit of + E. will always move from a point where the potential is high to one where it is lower; in other words, E. will always flow between two points where there is a difference of potential, and will cease to flow when that difference ceases. If E be charge, V the potential, C the capacity, then $C = E \div V$. From the definition of potential just given, what we have called the potential of the battery in the preceding illustration is in reality its *electro-motive force,* or the difference of potentials of its poles. As these are alike in power, but different in sign, and as the difference of two quantities of unlike sign is their sum, the electro-motive force is twice the potential of one pole. If the charging line be withdrawn, the ball will be in all respects as if charged by an electric machine. The battery having, so long as it acts, an unlimited supply of E., its electro-motive force remains the same; but when balls charge one another, the potential falls just as when a limited supply of water has its head reduced when made to run into another vessel. Potential, then, must be estimated by the resistance of the field, or the work value of the unit of charge. The charge being the same, the potential rises with the smallness of the body, or the thickness of the dielectric. Density is the quantity of electricity on a unit of surface, and *tension* is the strain which Faraday supposes to exist in the molecules of a dielectric when charged. Tension is commonly used in this country and abroad for potential, though our best writers never use it now in this sense.

Distribution of Electricity.—We might take it almost as a self-evident truth, that the greater the surface over which E. is diffused, the less is its electric potential at any particular point, and so we are taught by experiment. When two equal balls are insulated, and a charge is given to one of them, and then communicated to the other by contact with the first, it is found that both equally divide the charge, but that the potential of the E. of each is one half of that of the originally charged ball. When a watch guard-chain is charged and laid on the plate of an electroscope by means of a glass rod, the gold leaves diverge most when the chain lies in a heap on the plate; and as it is lifted up, the leaves approach each other, showing that as the exposed surface of the chain increases, the electric potential of each part diminishes. The reason of this is obvious. Let us begin with one ball with a certain charge, then take another equal ball and impart half the charge to it by making the two touch. A spark will be seen at the charge of the second ball. The quantity in both is still the same, but energy has been lost by the spark, and the heat generated by the spark is the measure of the loss. If we continue to add ball after ball until we have a very large surface, the quantity is the same as at first, but energy has been squandered in the sparks of each additional ball, and so the potential is lowered.

Experiment teaches us, that E. is exhibited only on the surfaces of conductors. A brass ball is suspended by a silk thread, and covered with two hemispheres, which can be held by insulating handles, and which exactly fit it. A charge is then communicated to the ball so compounded. When the hemispheres are withdrawn, they are found to take away all the E. with them, not the slightest charge being left in the ball. The same fact is exhibited by a hollow ball placed on a glass pillar, with a hole in the top large enough to admit a proof plane to the inside. When charged, not the faintest evidence of E. is found on the inner surface, however thin the material of the ball may be. The thinnest metal plate, when under induction, shows opposite electricities on its two faces. We learn from these and numerous other experiments, that *electricity is only found on the outer surfaces of conductors in an envelope of inappreciable thickness.* This fact is quite in keeping with Faraday's theory of the action of dielectrics. Within a conducting body we cannot expect E., for the moment it appears in it, the particles communicate their electricities to each other, and the electric state ceases. In a dielectric they cannot communicate, and the charge remains. Hence the charge at the conductor only appears at the junction of a conductor and dielectric.

We are also taught by experiment that the distribution of E. on the surface of insulated conductors is influenced materially by their form. An electrified ball, for example, exhibits the same density all round, for the resistance is sensibly the same on all sides of it. When, however, a conducting body is made to approach near enough to it, the density of the E. is found to be greater on the side on which the approach is made. This is proved by the aid of a proof plane and an electrometer. When work is done in drawing away the proof planes from the charged body, its potential, as tested by the

electrometer, is proportional to the density of the charge at the point where it touched. The reason of this unequal distribution is obvious, from the fact that the potential of the ball must be the same at every point. If, therefore, the resistance at one side be less than at another, the density there must be greater to maintain equality of potential. The disturbance of equal distribution here spoken of holds true only for short distances; the disturbing body, for instance, in the case under consideration, has to be brought very near before any inequality in the distribution of E. on the ball becomes manifest. It is to this concentration of E. on the side of the approaching conductor that we owe the electric spark; and it is as we near the striking or sparking distance that this disturbance is revealed. The concentration or fixing of E. on the side of the thinnest and best dielectric, is particularly illustrated in the condenser (q.v.) and Leyden jar, whose action depends upon it; but in these the dielectric must be very thin to secure decided effect. When a conductor somewhat in the form of a prolate spheroid is charged, and the electric density of the several parts tested by the proof plane, it is found to be least at the thickest part, and to increase towards either end; and the difference is found to be all the greater as each end becomes more and more pointed. It is found likewise that the electric density on a point is so great with a considerable charge as to destroy the dielectric condition of the air, the particles of which become electrified, and carry by convection the charge of the point to surrounding conductors. We therefore learn that *E. concentrates on points and projections.* A similar reasoning with regard to the relations of potential resistance and consequent density bears here as in the previous case. It may be here remarked that the density of charge at any point regulates the amount of tension at that point on the molecules of the dielectric. The constraint which they experience in being charged, and which Faraday calls tension, can only be carried to a certain limit. When that is reached, the molecules are forced to be conducting, and the tension ceases.

Electrometers and Electroscopes.—These words are generally taken as synonymous; electroscopes, however, should be applied to the instruments which give evidence of electrical potential without giving the exact measure of it; and electrometers to such as show both. Of late years, immense progress has been made in the construction of delicate electrometers, chiefly to meet the demands for such in the working or testing of submarine cables. Sir William Thomson's quadrant electrometer and his absolute electrometer, in point of exactness and delicacy, are a hundred-fold in advance of previous instruments. We shall here, meanwhile, describe the common forms of electric indicators. The *quadrant electrometer* consists of a conducting-rod, generally of box-wood or brass, with a graduated semicircle attached above, in the center of which is a pivot for the rotation of a straw carrying a pith-ball at its outer end. It is used for a charge of high potential, such as that of the electric machine. When placed on the prime conductor of the machine, the whole becomes charged with + E., and the ball is repelled first by the E. of the rod, and then by that of the prime conductor, the height to which it rises being seen on the semicircle. This is not an electrometer in the strict sense of the word, for although it tells us, by the straw rising and falling, when one potential is greater or less than another, it does not tell us by how much, the conditions of its repulsion being too complicated for simple mathematical expression. It can show us, however, by the indicator standing at the same point, when the electric potential of the machine is the same at one time as another.

The *gold-leaf electroscope* is a handy instrument for estimating roughly medium potentials. In one of the best of its forms a glass ball, about 4 in. in diameter, rests on a brass tripod, and its neck, about 1 in. in diameter, is inclosed by a brass collar fixed with shellac. A brass plate, with a hole of $\frac{1}{4}$th of an in. in diameter in the middle of it, can be screwed air-tight into the collar. Before it is so fitted, a brass rod, $\frac{1}{4}$th of an in. in diameter, is fixed by shellac or sealing-wax into the hole in the middle, so as to be perfectly insulated from it. The upper end of the rod ends in a brass ball, and the lower end is filled on each side, to allow of two strips of gold-leaf, 1 in. in length, being attached to it. Before the plate and leaves are finally fixed, the interior of the ball is thoroughly dried, by passing hot dry air into it, so that the ball contains no moisture to carry away the charge of the leaves. When the plate is screwed to the collar, there is no communication between the included and external air. The insulation of the leaves is complete; and they keep their charge, in dry weather, for hours together. When the instrument is used, it may be charged directly, by contact being established with the ball and the body whose E. we would examine, or a charge may be carried to it by the proof plane, when the leaves diverge according to the charge communicated. When we would ascertain simply the kind of E. with which a body is charged, we proceed in the following way: A glass tube is rubbed, and brought into the neighborhood of the brass knob; the leaves diverge by induction, and, when so diverged, the knob is touched with the finger, and the leaves fall to their original position, for they are then out of the line of action. In this state, — E. is fixed by the action of the + E. of the tube on the side of the knob next it, and the corresponding + E. is lost in the ground. When the finger is removed, the + E. is cut off, while the — E. remains in the knob; and its presence is manifested by the leaves diverging permanently after the removal of the tube. If, now, a positively electrified body be brought near the knob, it draws away the — E. from the leaves, and they consequently fall in; but if a negatively electrified body be brought near, it sends the — E. more to the leaves, so that they

diverge further. We are thus enabled to distinguish between a + and a − charge. But it may be asked, why not charge the electrometer immediately with the glass? There are two difficulties in the way of this. If the glass is powerfully electrified, it gives too great a charge; and if feebly, contact between the knob and the glass cannot be effected, although its E. acts powerfully by induction. We therefore bring the glass rod near the electrometer, and when the leaves diverge sufficiently, we touch the knob with the finger, and withdraw first the finger, then the rod, and the leaves diverge as before. For the more delicate use of the gold-leaf electroscope, see CONDENSER.

Coulomb's Torsion Balance has played an important part in examining the laws of electric forces. A glass canister is placed on a wooden frame, and is covered above by a plate of glass or wood; in the middle of this plate a round hole is cut, over which is fixed, by wooden fittings, a long glass tube having the graduated rim of a circle attached at its upper end. A circular plate, resting on this rim, closes the upper end of the tube; and when it is turned round, a mark upon it tells the number of degrees through which it has been moved. A cocoon thread or very fine wire is tied to a hook in the center of the lower side of this plate, and thence descends to the body of the canister. It carries below a collar of paper or other light material, in which a needle of shell-lac is adjusted having a disk of gilt paper placed vertically, or a gilt pith-ball at its one end, and a counterpoise at its other. When the plate above is moved through any number of degrees, the needle below, impelled by the torsion of the thread, comes to rest at the same number on the scale below. This last consists of a strip of paper divided into degrees, pasted round the cylinder at the same height as the needle. In the cover of the canister there is another opening, for the admission of a ball insulated at the end of a rod of shell-lac, and which, when supported by the cover, is on a level with the paper disk of the needle. When the instrument is adjusted for observation, the mark on the upper plate and the paper disk stand each at the zero-points of their respective scales, there being of course no torsion in the thread. The ball is removed, to receive a charge from the body under investigation, and is then placed in the cylinder, when the disk is first attracted, then repelled. Suppose that the disk be driven 40°, as shown by the lower scale, from the ball, and that the upper plate has to be moved in the opposite direction, through 160° of the upper scale, to bring it back to 10°, the total degree of torsion is $160° + 40° = 200°$. If the ball and disk be now discharged, and another charge be given to the ball, which requires 250° of torsion to place the disk at 10°, we have the relation 200 to 250, as that of the repulsive forces of the two charges, for the amount of torsion in degrees is proportional to the twisting force. Without entering further into detail, we may state the two laws that Coulomb established by this instrument: *The intensities of the mutual repulsion or attraction of two invariable quantities of electricity of the same or different names, are in the inverse ratio of the squares of the distance at which these act. The intensities of the total repulsive or attractive action of two electrified bodies placed at an invariable distance, are proportional to the products of their electric charges.*

Electric Machine.—In the tube of glass and silk rubber of which we have made frequent mention, we have the embryo of the electric machine, viz., a body which, when rubbed, is positively electrified, and its rubber negatively. The first requisite we should expect in a *machine* of this nature is a large surface, to give a great amount of electricity. But there is another already casually referred to: glass being a non-conductor, the E. formed on its surface has not a combined action, so that some arrangement is necessary to collect it, and render it available—to act, in fact, as its conducting reservoir. This portion of the machine is denominated the *prime conductor*. The rubbed surface of the electric machines is either a cylinder or plate of glass; hence we distinguish them into cylinder machines and plate machines. The former, from their more compact form, are the more manageable; and the latter, from both sides of the glass plate being rubbed, are the more powerful forms of the instrument. The description of Winter's plate machine (fig. 1) will be quite sufficient to show the general requirements and construction of electric machines. It is one of the best existing forms of the machine. The glass plate is turned on the axis *ab* by means of the handle *c*. The longer end of this axis, consisting of a glass rod, moves in the wooden pillar *d*, and the other rests in the wooden head of the glass pillar *e*. The plate is thus completely insulated, and little loss of its E. can take place through its supports. The two rubbers are triangular pieces of wood, covered with a padding of one or two layers of flannel, inclosed in leather, and they present a flat hard surface to the glass, so that friction between it and them takes place in every part. They are placed in a wooden frame on each side of the plate, and the

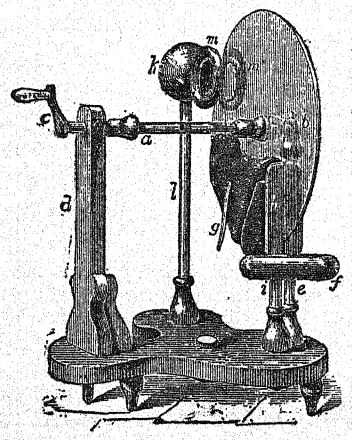


FIG. 1. Electric Machine.

pressure is regulated by metal springs, fixed to the outside between them and the frame. Before use they are covered with an amalgam of mercury, zinc, and tin, which is made to adhere with the aid of a little grease, and which increases immensely the production of electricity. The surfaces of the rubbers are therefore conducting, and are made to communicate by strips of tinfoil with the *negative conductor, f* (fig. 1). To limit the electric field in the neighborhood of the negative conductor, or, which is the same thing, to keep the potential of the glass from rising too high, so as to cause a discharge back into the rubbers, each rubber has a non-conducting wing fastened to it, which is made of several sheets of oiled silk, kept together by shellac varnish, beginning at the rubber with several, and ending with one or two sheets. When the machine is in action, electrical attraction makes them adhere to the plate; but when it is out of action, they may be kept up by a split pin *g*. As the plate turns, the rubbers are kept in the frame by their ledges *h*. The whole frame-work of the rubbers and negative conductor is supported by the short glass pillar *i*, so that it can be insulated when required. The prime conductor, *k*, is a brass ball insulated on the long glass pillar *l*, and to prevent the edges of the ball at the junction dissipating the E., the pillar enters the ball by a trumpet-shaped opening. The collection of the E. from the glass is made by a row of points placed in the grooves, inside of two wooden rings, *m*, *m*, which are attached on each side of the plate to a piece of brass projecting horizontally from the ball of the conductor. The grooves are covered with tinfoil, which conveys the collected E. to the ball, and the points are kept out of the way of injury by not projecting beyond the grooves.

There are four openings in the prime conductor: the lower one for the head of the supporting pillar; the one at the right for the attachment of the collecting apparatus; the one at the left for the stalk of a small brass ball; and the upper one for admitting the lower end of a large wooden ring, removable at pleasure. This last forms the peculiar feature of Winter's machine. It consists of a bent iron wire carefully covered all round with polished wood, and communicating by a brass pin at the foot of the stalk, on which it stands with the prime conductor. To receive the sparks from the machine, an appendage termed the spark-drawer is provided. This consists of a wooden pillar of the same height as the prime conductor, in the head of which a brass rod slides, with a large flat ball at the one end and a small ball at the other. All the fittings of the machine are of wood, no metal being used but for the prime and negative conductors. On using the machine, it is first necessary to connect the negative conductor by a wire or chain with the ground. As the plate is turned, — E. is developed on the rubbers, and led to the negative conductor; and + E. is formed on the glass, which is collected by the points, and transferred to the prime conductor. If the negative conductor be insulated, the electric field would be limited to the space between the negative and prime conductors; but when uninsulated, the floor and walls of the room form part of it, and the field now lies between the prime conductor and any surrounding object. If — E. is wanted, the negative conductor is insulated, and the prime conductor connected with the ground, when sparks of — E. are given off by the negative conductor.

The various forms of *electric discharge* through the air, or, as it is termed, *disruptive discharge*, can be well seen with Winter's machine. The negative conductor being connected with the ground, with a two-foot plate, we may observe them in the following order. On turning the plate once or twice, a faint snapping sound is heard, and, when the room is darkened, a flickering spark is seen to be thrown out from the two-inch ball projecting from the prime conductor, which has the form of a bush, without leaves, with trunk, branches, and twigs, about 10 in. in height. This is one form of what is called the *brush discharge*. Its general direction is horizontal, or not much inclined from it, but it turns to the hand or other flat conductor brought near it. If it be received on a ball, its various branches concentrate on it. If the brush proceed from the end of a brass rod, instead of from a ball, it becomes very much diminished in size, and resembles a brush of feathers. The brush discharge, though apparently continuous, has been found by Wheatstone to consist of a series of successive brushes. When discharge is effected from a point, a star or *glow* of light marks its termination, while strong currents of air proceed from it, which are strong enough to blow away the flame of a candle. These currents accompany more or less the various forms of the brush-discharge. The particles of air thus carry away the charge from a point to surrounding conductors, and hence a point is said to discharge itself by convection. If we connect the brass rod of the spark-drawer with the ground, or the negative conductor, and bring the flat ball opposite to the small ball on the prime conductor, straight brilliant sparks pass between them so long as the distance does not much exceed 2 inches. Beyond that distance, the sparks become somewhat crooked, and at about 4 in. the discharge begins to take the form of a brush. If, now, the ring be placed in the conductor, the sparks again pass with readiness, and the brush does not again take place till the ball of the spark-drawer is 11 or 12 in. off. The long sparks thus obtained with the aid of the ring are decidedly crooked or forked, with strongly marked lateral branches, which become all the more marked as they lengthen. It would thus seem that the spark has a tendency to break up into branches. When the striking distance is small, this is not perceptible; it is then straight and undivided. As the distance increases, it is crooked, with well-marked offshoots; and when the distance is too great, it splits up entirely into a bush or brush.

The ring is merely an extension of the prime conductor, and keeps down its electric density till a sufficient quantity of E. is collected, which can keep together in the form of a spark. Something similar occurs when water is driven out in spray from a small syringe, and in a jet from a large one, under an equal head. All the forms of disruptive discharge are accompanied with the peculiar electric odor which arises from the production of ozone (q.v.).

We may now make a short reference to the experiments performed by the machine, illustrative of the general properties of electricity. A wooden head with hair on it illustrates, when placed on the prime conductor, electrical repulsion, by the hair standing on end. A spoon containing ether is held so as to receive a spark from the projecting ball, when the inflammation of the ether illustrates the heat of the spark. A man standing on an *insulating stool* (a stool with glass legs), with one hand on the conductor, can send sparks, with his other hand, to everything and everybody about him. This illustrates communication of E. by contact. A few pith-balls are inclosed in a glass jar, having its top and bottom of metal—the former in connection with the prime conductor, and the latter with the ground, when the pith-balls, by their rising and falling, show the attraction of unlike, and the repulsion of like electricities. A gas-jet may be lighted by a person wholly unconnected with the machine, and standing some 8 or 10 ft. from it. If the person so situated holds the blade of a knife or other point over the gas-burner, at a distance only short of touching, at each long spark from the machine, a small spark passes between the blade and the burner, and this ignites the gas. The reason is as follows: The body of the person in question is electrified negatively by the extensive prime conductor of the machine acting inductively. When the spark passes, the electric tension of the ring falls, and the negative E. of his body must return to the ground, and taking the easiest route, causes the spark in question. This is quite similar to what is known in thunder-storms as the *back-stroke*. A person in a prominent position, under a highly-charged cloud, experiences a violent, sometimes fatal shock at the same time as a flash of lightning, although the flash was not at all near him.

Induction Machines.—In frictional machines there are two ways in which energy is expended—in friction, and in drawing away the two excited and attracting surfaces. Much of the force expended in friction results in heat, and only a fraction (sometimes a small one) in electricity. Of that spent in drawing away which is the less considerable, the whole results in increased potential. Machines are therefore very desirable where, with a small initial charge, a constant supply of electricity may be got by the latter method. The electrophorus (q.v.) is a machine of this kind, and has been known since 1776, and Nicholson's doubler, another, since 1788. But the action of these has only been on a small scale. Lately, however, induction machines of great power have been made, the powers of which quite eclipse the older frictional machines. The best known of these is Holtz's machine (invented 1865), which will suffice to show the general construction of such.

Holtz's machine consists of two glass disks, A and D (fig. 2), of very thin glass carefully covered over with shellac varnish. The one, D, is somewhat larger than the other, A. The plate D is stationary, and is kept in its place by four circular grooved rings of vulcanite V, V, V, V, placed in horizontal glass rods, which themselves are supported by upright glass pillars *a*, *a*, *a*, *a*. By this method of support the plate D may be turned round to rest in any position. The upright glass pillars rest on the sole of the instrument, and pass through two solid blocks of vulcanite L, L', which serve to knit the whole frame well together. In L two brass rods R, R', are fixed, which, on the end next the revolving plate A, each support a horizontal row of teeth facing the plate A; and on the other, two sliding rods with vulcanite handles H, H', which can be adjusted to distance, and which form the poles of the machine. The revolving plate A is fixed in a vulcanite spindle, the ends of which move in the blocks L, L'. This plate is made to revolve at great speed by a handle and multiplying belts. It is unbroken, and revolves as close to the plate D as to keep clear of it. The stationary plate D, which is shown in fig. 3, has two holes cut in it like those at P and P'. The lower edge of the one opening, and the upper edge of the other, lie along the line of the teeth of the two poles already mentioned. On the side of the plate D, away from the revolving

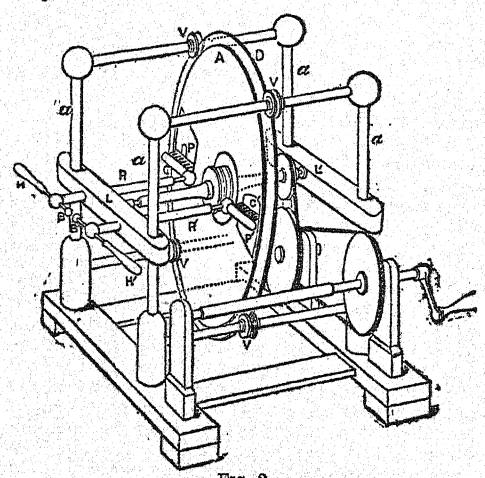


FIG. 2.

plate, are stuck two coolings or armatures of varnished paper C, C′, and from those protrude two tongues, also of varnished paper, slightly turned into the openings of the fixed plate, and towards the revolving plate. The size of the revolving plate is shown in fig. 3 by a dotted circle.

Suppose now we have to work the machine, and let us take one whose plate (a usual size) is 2 ft. in diameter. We first of all put the two poles B and B′ in contact—we see that the teeth lie opposite the line TT′, and that the revolving plate revolves in the opposite direction to the tongues P, P′, or which is the same thing, that the revolving plate passes an opening before coming to the row of teeth. We next take a sheet of vulcanite about the breadth of an armature, and rub it with cat's skin (making it —), and hold it close to the armature C, and then make the plate revolve. We at once know if the machine is working by a rushing sound. We now gradually withdraw the two balls at the poles, and a rush of straight, bright but not very dense sparks leap across between the two for the first 2 in. or so. When the distance becomes greater than that, brushes proceed from each end, and there is a fine purple glow in the central space. If we withdraw the poles to 5 or 6 in., two well-defined brushes are seen, one at each pole, the larger and most fully formed being the + brush at B′. The — brush at B′ is much smaller. If now the hand be placed on one pole and the other hand presented to the other, sparks of 2 in. are got which produce a most painful stinging sensation on the hand, but cause no twitching at the joints of the arm. When the poles are at a distance of half an inch, paper and other combustible substances may be kindled by the spark. On examination it is found that C, or the armature first touched by the excited vulcanite, is — (as shown in fig. 3), and that the other is +; that B, which is opposite C, is —, and B′ +. If the machine be viewed in the dark, long + brushes are seen at P and the tooth opposite it, and — stars at P′ and at the tooth opposite or attached to B′. The plate is + below—that is, after passing the negative armature; and — above, after passing the + armature. If the motion of the plate be reversed, the electricity of the poles changes sign or ceases altogether, when the machine must be excited anew. If kept moving in the same direction, and allowed to rest only for short intervals, it may be kept in action for hours together without renewed excitement.

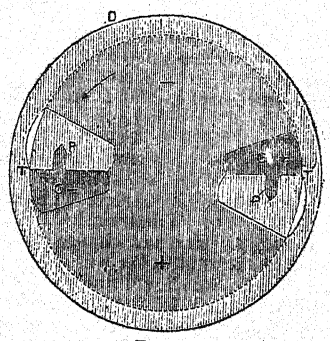


Fig. 3.

In order to get long dense sparks, a small Leyden jar is hung on each of the rods R, R′, with their outer coatings in metallic contact. With these condensers a splendid series of long, intensely brilliant sparks of 6 in. in length are got, each accompanied with a snap painfully loud, quite eclipsing anything shown by friction machines. The condensed spark does not kindle paper, but gives a very powerful shock.

We have not space to enter into the theory of Holtz's machine. Indeed it may be questioned if, in all points, its action has been fully accounted for. We would only say that reciprocal action of the armatures on each other is common to all induction machines, and is quite similar to Siemens and Wheatstone's principle for magneto-electricity (see Magneto-Electric Machines).

Leyden Jar.—This is a glass jar, with a coating of tin-foil pasted carefully inside and out, extending to within a few inches of the mouth. This last is generally closed by a wooden stopper, through which passes the stalk of a brass knob or ball, surmounting the whole. The connection between the inside coating and the ball is completed by a chain extending from the stalk to the bottom of the jar. If this jar be put on an insulating stool, so that sparks can pass from the prime conductor of a machine to the knob, when the jar is thus insulated, one or two sparks pass, and then the charge seems complete, for no more sparks will follow, though the action of the machine is continued; or if they do, they are immediately dissipated from the knob in a brush discharge. If then, however, the knuckle of the experimenter be brought near the outer coating, sparks begin again to pass freely; and for every spark of + E. that passes between the machine and the knob, a corresponding spark of the same name passes between the knuckle and outer coating. This continues for some time, and then the jar appears to be again saturated. It is now said to be fully charged. The outside of the jar can, in this state, be handled freely, and if it be still on the insulating stool, so may also the knob, although, when the hand first approaches, it receives a slight spark. But if, when the experimenter has one hand on the outer coating, he bring the other hand to the knob, before it can reach it, a straight, highly brilliant spark passes between the knob and his hand, and he experiences a shock of great violence. If he try the same thing again, a feeble spark and shock again ensue, and the jar is now thoroughly discharged. As it is highly inconvenient, if not dangerous, to discharge the jar through the body, *discharging tongs* are used for that purpose, which consist of two brass arms ending in balls, and moved on a hinge by glass handles.

A very instructive experiment may be made when the coatings are fitted to the jar

so as to be removed at pleasure. After the jar is charged, it is put on an insulating stand. The inside coating is lifted out by the knob, and a slight spark is got by the hand in doing so. The jar is now taken up by one hand, and the outside coating is removed by the other, and, as before, another feeble spark is got. The whole is now built up in inverse order and discharged, when the spark is nearly as brilliant as when it is discharged at once without such dissection. From this it may be argued that the charge of the jar lies in the glass and not in the coatings, and that it is likely that in all cases it is in the dielectric the charge resides; that the conductors, which are usually looked upon as the seat of the charge, are merely the limiting surfaces or exponents of it. A portion of the total charge may reside in them, but no more than is found on two similar contiguous dielectric surfaces. Taking this for granted, it is easy to explain the action of the leyden jar. The electrifying power of the charging machine is exerted on two dielectrics—the glass of the jar and the air—the external limit in both cases being the surrounding objects which constitute the ground. The action on the air through the inside coating or the knob is quite-similar to what we find in the case of any body to be charged. The action through the glass is peculiar, because we are shut out from it. The limits of this action are the inside surfaces of the inside and outside coatings. The air charge we participate in as we move in it. We are, however, quite external to the action on the glass; but if we could move about in it between the coatings, we should find things there exactly similar, so far, at least, as kind of action is concerned, to what we find in charged air. Seeing that the glass of the jar is a thin and good dielectric, and the air much thicker and more difficult to polarify, the charging power of the machine is exerted for the most part in the glass, the polarification in the air being comparatively slight. Assuming E. to be a polarification of molecules, the E. of the jar resides thus in glass, and to a much less extent in the air. The potential at the inner coating is the same as that at the knob, for any connected system of good conductors must be at the same potential. We judge of potential by the air charge, and thus we take the potential at the knob as the potential at the inner coating. The spark got from the knob of the insulated jar is small compared wtih that of the charging machine, and as sparking distance is, generally speaking, proportional to potential, the potential of the jar is much below that of the charging machine. Thus, a *Leyden jar is a contrivance for accumulating large quantities of electricity at a low potential.* The thinner the glass, the greater will be the accumulation of electricity, but the feebler will be the potential of the jar. When the electric field is limited, as in the glass of the Leyden jar, it is sometimes said to be *bound,* as distinguished from the *free* charge of an ordinary air field.

When the knob of the insulated jar is touched, a spark is got, and if the finger be then removed to the outer coating, another spark, but of the opposite name, is obtained, and the knob is again prepared to give a spark, and this alternating process may be continued till the jar is emptied. When the inner coating is touched, the outer coating becomes insulated, and thus the potential always shifts to the insulated coating with an opposite name to what it had before. Each spark obtained by the finger in going from the one to the other consumes so much of the energy of the charge, and so the potential is gradually lowered. When the jar is discharged by the tongs, the charge of the dielectric glass is thrown into the dielectric air. The particles of the glass, though more easily electrified than those of air, having a higher specific inductive capacity, offer a much greater resistance to discharge than those of air. At the same stage of polarification, the air gives way, while the glass still keeps polarified. Hence a jar with glass only a fraction of an inch in thickness can give rise to an air-spark of several inches; besides this, the charge in the glass is somewhat uniformly distributed. In the air, with the tongs, the force of the charge is concentrated on a certain region of it, and the breaking down of the conductive resistance of the air is more easily effected. The feeble *residual* spark from the jar, after the first main discharge, is due to what is called *electric absorption.* Somehow, the E. given to a dielectric is not immediately available when a circuit is offered, the dielectric taking some time to recover itself. This is observable in all solid dielectrics, but no trace of such action is found in air.

The sparking or *striking distance* of the jar indicates the potential of the charge. The quantity may be measured by the turns of the charging machine. It is found that when the same quantity is given to two jars, one double the other in point of covered surface, the striking distance of the large jar is only half that of the small jar; and that to charge the large one so as to obtain the same length of spark, twice the quantity must be given. If two jars be taken of the same size, and one of them be charged, we find that, on connecting their outside coatings, a spark passes when their knobs are brought together, and that, when now the double jar is discharged, the spark is only half as long as was got from the single jar discharged directly. The quantity discharged finally in the double jar was the same as in the single jar, but the potential was half. The spark occurring at the participation of the charge accounts for the loss of potential.

For great power, large surfaces are necessary. This can be obtained either by constructing a large jar, or by uniting several small jars together so as to act as one. The latter method is preferable, as we can vary the surface according to the number of jars employed. A combination of small jars united together as one is called an *electric*

battery. In a very convenient form of electric battery the knobs of each jar communicate with a large central one by means of arms of brass moving on hinges, and the outer coatings are put in conducting connection, by being placed on an insulated stool covered with tinfoil. The interior coatings are conveniently charged by a long projecting arm from the central knob, and the exterior ones by connecting the stool with the knob of the unit jar, or by a wire with the ground. Any jar can be thrown out of action by throwing back its arm.

By discharging the Leyden jar or electric battery through particular channels, we obtain some beautiful illustrations of the power of electricity. When the discharge is effected through thin wires of gold or platinum, the heat accompanying its passage is so great as to dissipate them in vapor. The expansion of the air caused by the spark is shown by the *electric mortar*. This is a wooden mortar with two wires entering air-tight at the opposite sides of the breach, with a small wooden ball fitting closely in the muzzle. The spark passing between these wires in discharge causes a sufficient expansion of the air within the mortar to drive the ball to some distance off. When the discharge is made through gunpowder, it tosses the grains violently about, but causes no ignition; when, however, it is retarded by introducing an imperfect conductor, such as a wet string, into the circuit, the gunpowder is fired. When the discharge is made through glass by two points pressing against its opposite surfaces, a small hole is drilled into the glass.

Velocity of Electrical Discharge.—The velocity of E. is found to vary with the nature of the circuit to the extent, indeed, of its inductive embarrassment (see TELEGRAPH). Thus, in air-lines of telegraph it is greater than in sea-cables. Wheatstone was the first to determine the velocity of E. in an insulated copper wire stretched in air. He did this by the device of a revolving mirror. Any one who takes a mirror in his hand and makes it revolve, sees that objects are apparently displaced by it, and that the reflected image describes an angle the double of that of the mirror. If, while the small mirror rotates at 50 turns a second, the image of a spark should show a displacement of 90°, we know that the mirror has moved through 45°, and the time during which this takes place is $\frac{45}{360}$ of $\frac{1}{50} = \frac{1}{400}$ of a second. If the duration of the spark, then, had been $\frac{1}{400}$ of a second, we should have seen its image move through 90°. The eye, however, during this time would not have been able to discern any difference between the beginning and the end of the spark, so that the 90° would have appeared as one arc of light. Examined in this way, however, the spark of a machine and of a Leyden jar were seen as if the mirror had been at rest. He arranged a Leyden jar circuit of half a mile with three breaks in it, two near the coatings, and one in the middle of the half-mile, and had these breaks placed nearly side by side, so that the sparks at them, when discharge took place, could be seen together in the revolving mirror. He found that all three sparks had a duration of $\frac{1}{2000}$ of a second, and that the middle spark occurred so far behind the other two as to indicate a velocity of 194,000 m. per second in the wire.

Electric Theories.—There are two theories which have played an important part in the history of the science—the two-fluid theory of Dufay, and the one-fluid theory of Franklin. According to the former, matter is pervaded with two highly elastic imponderable electric fluids—one, the vitreous; the other, the resinous. These are supposed to repel themselves, but attract each other. Neutral bodies give no evidence of their presence, for they are there neutralized the one by the other; but when by friction or other operation the fluids are separated, each body observes the attractions and repulsions of the fluid it happens to have. According to the latter, there is only one electric fluid which repels itself, but attracts matter. Friction determines a gain of the fluid to the positive, and a loss to the negative body. Faraday's theory of electric induction by contiguous molecules appears to be gaining ground. "It explains satisfactorily how conductors and non-conductors are alike in kind; how the charge on the conductor can only reside at the boundary of the conductor and non-conductor, or—which is the same thing—the surface of the conductor; how the charge resides *in* the dielectric; how the polarity of the galvanic circuit is effected; how a battery current originates in and effects chemical decomposition; and how the velocity of discharge is dependent on the conformation of the circuit" (*Electricity*, Chambers's Educational Course, 1867). Prof. Clerk Maxwell's classical work, *Electricity and Magnetism* (1873) gives to Faraday's views a mathematical significance and comprehensiveness hardly contemplated by the great philosopher himself.

ELECTRICITY, ANIMAL. In this article we shall notice (1) the electricity developed by the so-called electrical fishes; (2), the electric properties of muscle and nerve; and (3) the electric phenomena of membranes and glands.

1. Although the peculiar powers of the torpedo and of the gymnotus were well known to the ancients, the first scientific discovery in this department of electricity was the determination of the electrical character of the shock of the torpedo by Walsh in 1772 ("Of the Electric Properties of the Torpedo," *Philadelphia Transactions*, 1773). From that date to the present time, the electric organs of certain fishes, which will be immediately mentioned, have been made the object of special study by some of our greatest anatomists and physiologists, amongst whom may be named John Hunter, Gal-

vani, Rudolphi, Knox, Valentin, Pacini, Matteucci, Goodsir, and Jobert de Lamballe, who has published a special work, entitled *Des Appareils Electriques des Poissons Electriques* (Paris, 1858), accompanied by a magnificent volume of plates.

The species of electrical fish which has been the longest known, is the *raia torpedo*, or electric ray, which has much the appearance of a skate. It is common in the bay of Biscay and in the Mediterranean, but is seldom met with on the shores of Britain. It grows to a considerable size, and is often above 80 lbs. in weight. It is now usually regarded as not a true ray, but as constituting a distinct genus, to which the terms *torpedo* and *narcine* have been applied by different naturalists—the latter name being derived from the Greek word *narke*, which was given to it by Aristotle. The electric organs or batteries are placed on each side, in the spaces between the pectoral fins, the head and gills. See TORPEDO. Each battery consists of a number (varying according to the age of the animal) of hexagonal prisms, which extend perpendicularly between the dorsal and abdominal surfaces, and present somewhat of a resemblance in shape and arrangement to the cells of a honey-comb. Four nerves, which are branches of the fifth and eighth cerebral pairs, go to each battery; and the nervous center of the electrical apparatus is, therefore, the *medulla oblongata*. Several species of *narcine* are known, all of which possess the electric property.

The ordinary rays and skates possess an organ in the tail which closely resembles the electric organ of other fishes, but its function is still doubtful; and in opposition to the view of its electric nature, it may be mentioned that while Dr. Starke (to whom the discovery of this organ is due) found it in the tail of every species of true ray, both professor Goodsir and M. Robin ascertained it to be wanting in the tail of the *torpedo*.

The *gymnotus electricus*, or electrical eel, is little inferior in celebrity to the *torpedo*. It is common in all the streams which flow into the Orinoco, and is generally procured from Surinam. It is usually 3 or 4 ft. in length, but may reach a length of 6 feet. The whole of its viscera lie close to the head, and the anal aperture is only 2 in. behind the mouth; all the rest of the body inferiorly is occupied by the electrical apparatus, which consists of four batteries—viz., two on either side, and one above the other—the uppermost or dorsal being the larger. These batteries consist of a number of piles placed horizontally in a direction from head to tail; and from this circumstance, as well as from their peculiar structure, they were compared by Redi to galvanic troughs. The number of these piles in the greater battery, is from 30 to 60; in the lesser, from 8 to 14. These batteries are supplied by about 224 pair of nerves on each side, derived from the inferior or motor roots of the spinal nerves.

Humboldt, both in his *Personal Narrative* and in his *Views of Nature*, gives a graphic account of the mode in which the Indians catch wild horses through the agency of the gymnotus. Faraday made numerous observations on a specimen, 40 in. in length, which was exhibited in the Adelaide gallery some years ago. He calculated that, at each medium discharge, the animal emitted as great a force as the highest charge of a Leyden battery of 15 jars, exposing 3,500 sq.in. of coated surface. The strongest shocks were obtained by touching the fish simultaneously near the head and near the tail; scarcely any shock being felt if the hands be placed one on each side of the fish, at the same distance from either extremity; the amount of the shock, as might have been expected, varying with the length of the column which produces it. The shocks have sufficient power to stun, or even to kill fish; and the same discharge produces a more powerful effect upon a large fish than it does upon a small one, since the larger animal exposes a larger conducting surface to the water, through which the electricity is passing, and, consequently, it receives a more violent shock. On one occasion, when a live fish was put into the tub, which was 46 in. in diameter, the animal was seen to coil itself into a semicircle, the fish lying across the diameter; this was the most favorable position for giving the strongest shock; an instant afterwards, the fish floated dead upon its side, and was then devoured by the *gymnotus* (q.v.).

The shock of both the *torpedo* and the *gymnotus* gives rise to momentary currents of sufficient intensity to deflect the galvanometer, to magnetize a needle, and to decompose iodide of potassium; and from both fish, sparks have been obtained.

We next come to the electrical fishes of the genus *malapterurus*. The only fish of this genus whose electrical organs have been examined and described is the *M. electricus* of the Nile, called raash or thunder-fish by the Arabs. It has barbules dependent from the region of the mouth, like the common barbel; and its smooth skin is diversified with irregularly shaped spots. Its length is from 8 to 14 inches. The batteries are two in number, "separated," to adopt prof. Goodsir's description, "but at the same time intimately connected to one another in the mesal plane along the dorsal and ventral margins of the body, so as to form a continuous layer of a gelatinous consistence closely adherent to the skin, and inclosing as in a sac the entire animal, except the head and fins." The structure of these batteries is very complicated, and we shall not attempt to explain it.

In the year 1854, a new electrical fish became known to us, belonging to the same genus as the one just described. It is found in the muddy brackish water of the river Old Calabar, which empties itself into the bight of Benin. The fish has accordingly

been named the *malapterurus Beninensis* by Mr. Andrew Murray, who has described and figured it in the *Edinburgh Philosophical Journal* for July, 1855. It is much smaller than the Nilotic species, and the formulæ of the number of fin-rays differ in the two species. We believe that this new species was dissected by the late prof. Goodsir, but we are not aware that the results were ever published. See MALAPTERURUS.

Our limits will not allow of our noticing the successive opinions which have been entertained regarding the action of the electric organs in fishes. Those of our readers who wish to investigate this abstruse subject may be referred to prof. Goodsir's memoir, "On the Present State of Organic Electricity," in the *Edinburgh Philosophical Journal* for Oct., 1855. We cannot conclude our notice of electric fishes without directing the attention of our readers to an extremely interesting memoir by the late prof. George Wilson, "On the Electric Fishes as the earliest Electric Machines employed by Mankind," which is contained in the *Edinburgh Philosophical Journal* for Oct., 1857, in which he discusses (1) the antiquity of the practice of using the electrical fishes as remedial agents, and (2) the extent or generality of that practice.

2. The study of the electrical properties of muscle and nerve dates from the period (1786–94) in which Galvani made his great discoveries. Having first ascertained that contractions were produced by electricty in the muscles of a recently killed frog, he subsequently found that similar contractions occurred when two dissimilar metals in contact with one another were brought in contact with the nerve and muscles respectively of the frog's leg. The experiment may be readily made in the following manner: Expose the crural nerve of a recently killed frog; touch it with a strap of zinc, and at the same time touch the surface of the thigh with one end of a bit of copper wire. At the moment that the other end of the wire is brought in contact with the zinc, the limb is convulsed; but the convulsions cease when the two metals are separated from each other, though they are still in contact with the animal tissues; and they are renewed when the zinc and copper are again made to touch. At first, Galvani believed that the contractions were due to electricity evolved by the metals, but finally he concluded that it is produced by the animal textures themselves. No important step in this direction was afterwards taken till 1827, when Nobili, with his improved galvanometer (q.v.), discovered the electric current of the frog. He found that when the circuit of the nerve and muscles of the leg is closed by the instrument, a deviation of the needle, to the extent sometimes of 30°, occurs, due to a current which passes in the limb from the toes upwards, and which could be increased when several frogs were simultaneously included in the experiment. Undoubted proof was thus afforded that electricity is developed in connection with muscle and nerve.

The researches of Matteucci, confirmed by the subsequent investigations of Dubois Reymond, have demonstrated the existence of what is termed *the muscular current* in living animals. They show that in the living animal an electrical current is perpetually circulating between the internal portion and the external surface of a muscle—a current due probably to the chemical changes which are always occurring in the animal tissues. This muscular current ceases in warm-blooded animals in a very few minutes after their death; but in cold-blooded animals, as in the frog, it continues for a much longer period. The following is perhaps the best experiment for showing the existence of the muscular current: Five or six frogs are killed by dividing the spinal column just behind the head; the lower limbs are removed, and the integuments stripped off them; the thighs are next separated from the legs at the knee-joint, and are cut across transversely. The lower halves of these prepared thighs are then placed upon a varnished board, and so arranged that the knee-joint of one limb shall be in contact with the transverse section of the next, and thus a muscular pile is formed, consisting of ten or twelve elements; the terminal pieces of this pile are each made to dip into a separate small cavity in the board, in which a little distilled water is placed. If the wires of a sensitive galvanometer be attached to a pair of platinum plates, and these plates be placed simultaneously, one into each cavity in connection with the muscular pile, a deviation of the galvanometer needle will be observed in a direction which indicates the existence of a current passing from the center or cut transverse surface of the muscle towards its exterior.

Dubois Reymond has subsequently shown, by the use of extremely sensitive instruments, that even the smallest shreds of muscular tissue exhibit proof of the existence of such a current; and he has established the general law, that any point of the natural or artificial *longitudinal* section of a muscle is positive in relation to any point of the natural or artificial *transverse* section.

3. The electrical relation of membranes and glands have been especially studied by Mr. Baxter, whose "Experimental Inquiry, undertaken with a View of ascertaining whether any or what Signs of Current Electricity are manifested during the Organic Process of Secretion in Living Animals," is published in the *Philosophical Transactions* for 1848 and 1852.

His chief conclusions regarding the electrical condition of the intestinal mucous membrane are:

1. When the electrodes of a galvanometer are brought into communication—one with the mucous membrane of the alimentary canal, and the other with the blood flow-

ing from the same part—a deviation of the needle takes place, indicating that the mucous secretion and the blood are in opposite electrical states.

2. The effect ceases after death, and may be considered as arising from the decomposition of the blood—viz., from the changes which occur during the formation of the secreted product and venous blood.

His conclusions regarding the electrical relations of the secretions and blood of the liver, kidney, and mammary gland, are as follow:

1. During biliary secretion, the bile and the venous blood flowing from the hepatic veins are in opposite electrical states.

2. During urinary secretion, the urine and the venous blood flowing from the renal vein are in opposite electrical states.

3. During mammary secretion, the milk and the venous blood flowing from the mammary veins are in opposite electrical states.

For further information on this subject, the reader is referred to Matteucci's *Lectures on the Physical Phenomena of Living Beings*, translated by Dr. Pereira; to his series of "Electro-Physiological Researches," published in the *Philosophical Transactions;* and to Dubois Reymond's *Untersuchungen über Thier-Electricität.*

ELECTRICITY, MEDICAL. Electricity, in its application to medicine and surgery, is employed in the following forms: 1. *Electrization*, by electricity of high tension, as obtained by friction of glass in the common electrical machine; 2. *Galvanization*, by current electricity of quantity, as set in motion by the voltaic battery; and 3. *Faradization*, by induced or interrupted currents, produced by magneto-electric or electro-magnetic induction coil machines.

Electrization.—Frictional electricity is now seldom employed in therapeutics, on account of the inconvenience experienced in the management and insulation of the glass or common electrical machines; yet the powerful stimulant and counter-irritative effect of sparks drawn from the affected parts is still recommended in paralytic affections, in chorea and other nervous diseases; and the succussion produced by shocks from the Leyden jar is undoubtedly the most effectual remedy in amenorrhœa.

Galvanization.—The effect of passing a voltaic current from a battery of many elements through the living body, is to cause a shock or contraction of the muscular tissues, succeeded with a distinct interval by a momentary sensation or flow of heat due to the electric and nervous (?) polarization of the circuit. During the continued passage of the current, slight tingling sensations and elevation of temperature are observed, especially in those parts in contact with the electrodes or poles, which become painful and congested, and finally inflamed and ulcerated. On opening the circuit, the depolarization of the tissues which ensues is accompanied by a second shock and subsequent glow of heat, which are powerful in proportion to the length of time the circuit has remained closed. The amount of contraction in the muscle has relation to the *intensity* rather than the *quantity* of electricity passed through it—that is, to the rapidity with which the electric state is changed, rather than the amount of that change. The calorific effect of the current is proportionate to its *quantity.* Thus, a single pair of plates of platinum and zinc, an inch square (charged with chromic acid), will, under ordinary circumstances, exercise little or no physiological effect; but if the same pair be divided, so as to form a compound battery of twelve smaller pairs, its application will be attended with the shocks and calorific effects described. A further division into 24 or more pairs increases the shock, but the sensation of heat becomes less marked. With certain limitations, therefore, the shock of the battery depends on the number of its elements, without regard to their size, its calorific effect to the area of its plates. The nerves of the organs of special sense, when subjected to galvanization, evidence phenomena peculiar to their proper function. Thus, the passage of the current through the retina is attended by the sensation of a flash of light, which is bluish when the positive pole is applied to the eye, and tinged with the complementary orange when the force is transmitted in the opposite direction. A faint sensation of light is also perceived when the skin of the face or mucous membrane of the mouth is galvanized, caused by reflex action from the sentient filaments of the fifth pair of nerves which are distributed to those parts. Galvanization of the ear gives rise to bubbling, ringing, or cracking sounds, and occasionally to distinctly musical tones; that of the tongue, to an acid taste under the positive pole, and an alkaline taste under the opposite one; that of the lining membrane of the nose, to sneezing and a peculiar smell, which differs with the direction of the current. The continuous gentle action of small single and compound voltaic arrangements has been more or less successfully employed in paralysis, amaurosis, and neuralgia, either by application to the surface of the body, or carried directly to the affected parts by needles thrust into them (galvano-puncture). More powerful batteries, consisting of six or eight cells of the carbon battery of Bunsen, the nitric acid battery of Grove, or the platinized zinc battery of Strethill Wright, have been used to coagulate the fibrinous contents of aneurismal sacs—to decompose calculi in the bladder (?)—and to render platinum plates or wires incandescent, for the surgical cauterization of internal parts not otherwise easily accessible.

Faradization.—The instruments employed for the exhibition of interrupted or induced

currents are the magneto-electric and the electro-magnetic coil machines. In the first, the electricity is set in motion in a long thin wire coiled round a bar of iron or keeper maintained in constant whirling motion before the poles of a permanent horseshoe-magnet, the magnet with every half revolution magnetizing the keeper alternately in opposite directions, while the constantly recurring magnetism of the keeper in its turn induces impulses of alternating currents in the coil-wire. The disadvantages of the magneto-electric machine, therefore, are, that it is not self-acting, and that its currents pass alternately in opposite directions. In the electro-magnetic machine, the thick coil-wire, wound over a core of iron, is made to conduct the current from a single voltaic pair which magnetizes the iron. When the battery-current is interrupted, the iron core becomes instantly demagnetized, and this change in its magnetic condition is attended with a rearrangement of the polarity of the coil-wire, and the passage through it of an impulse of induced electricity. By a simple arrangement, the magnetized iron is made to interrupt and renew the battery-current; and the machine thus rendered self-acting, furnishes a rapid succession of momentary currents passing in the same direction, and of much greater quantity than those of the magneto-electric machine. Currents higher in tension, less in quantity, and more resembling frictional electricity, may be obtained from an additional coil ("secondary coil") of very thin and long wire wound over the former one, but they are not of much importance in medical practice.

The physiological action of the coil-machines is equivalent to that of rapidly repeated discharges from a large Leyden jar weakly charged; and as the time engaged by the passage of each impulse in the succession of discharges is too short to permit the development of any decided polarization of the tissues, the distinct calorific effects which accompany the commencement and cessation of the *galvanic* discharge do not occur. The continued passage of the interrupted currents acts chiefly as a mechanical stimulant, first exciting, and after a time depressing the vitality of the part in the circuit; and its effects have been very closely imitated by vibratory impulses, produced altogether irrespective of electrical agency.

Faradization is applicable to a great variety of chronic diseases in which a deficiency of functional energy exists; in paralytic affections unconnected with active disease of the nervous centers, mercurial and lead palsy, and in that produced by rheumatic affection and exposure to cold; in nervous or hysterical aphonia, or loss of voice; in amaurosis (q.v.), when not connected with inflammatory or organic disease; in nyctalopia, or night-blindness; in amenorrhœa, when uncomplicated with active disease of the uterus; in suppression of the lacteal secretion; in constipation (q.v.) from deficiency in the peristaltic action of the intestines; in paralysis of the bladder (?), and with very doubtful effect in the induction of uterine contraction; in suspended animation from drowning, narcotic poisons, etc. In spasmodic and neuralgic diseases, the benefit of faradization is less to be depended on; but a very gentle and long-continued application of it has afforded relief in the distressing starting of the lower limbs which occurs in paraplegia or paralysis of the lower half of the body; in "writer's cramp," and spasmodic forms of hysteria; in tic-douloureux, sciatica, and hysterical neuralgia. Faradization by electro-puncture has been successfully employed to induce the union of non-united fractures, the currents being passed between the disjoined ends of the bones; and to excite absorption in bronchocele and hydrocele, though with more doubtful effect. The intense sparks from the "secondary coil" have been used in place of those obtained by frictional electricity; and lastly, it has been proposed to employ the brilliant streams from powerful induction coils confined in fine "vacuum tubes" of glass, to illuminate internal parts of the body, for the performance of surgical operations, etc.

ELECTRIC LIGHT. All known methods of generating electricity can produce light of greater or less steadiness and brilliancy. Cavallo, in his treatise published a century ago, refers to a light, different from the electric spark, produced by frictional electricity. A needle or wire presented to an insulated person, at the distance of about 1 in. from his body, while he is actually rubbing the tube, will, he says, exhibit a lucid pencil of rays, seemingly issuing from the point and diverging towards the person; and other like experiments are described by Watson and other early writers. Light from battery electricity was first discovered by sir Humphry Davy at the royal institution, London, in 1810, when, on the continuity of a current from 2,000 cells being broken, a brilliant light was seen. To this the name of the "voltaic arc" was given, and the points where the current was broken were termed "electrodes." An early and simple arrangement for producing this light consisted of two carbon-points fixed into hollow brass rods, which are connected with the battery by wires entering at binding screws. The rods slide in the heads of glass pillars. The wires from the battery being connected, the points are made to touch, and are then withdrawn a line or two, when a dazzling light appears, approaching the light of the sun in purity and splendor. Its intensity prevents the naked eye from examining its form, but this may be ascertained by projecting the images of the points on a screen, when it is no longer painful to the eyes. The light is partly due to the incandescence of the tips of the carbon, and partly to an arch of incandescent particles extending from the one to the other. The positive pole is brightest and hottest, as may be proved by intercepting the current, when the positive

pole continues red for some time after the negative pole has become dark. During the maintenance of the light, a visible change takes place in the condition of the poles, and the positive pole becomes blunt by the loss of particles of carbon. The wasting away of the poles renders the distance between them too wide to allow of the passage of the current, and the light is thus suddenly extinguished, until again renewed by contact and removal. The heat of the *voltaic arc* is very intense. Quartz, the sapphire, magnesia, lime, and other substances equally refractory, are forced by it into a state of fusion. The diamond when placed in it becomes white hot, swells up, fuses, and is reduced to a black mass resembling coke. The electric light can be produced in a vacuum, and below the surface of water, oils, and other non-conducting liquids, and is thus quite independent of the action of the air.

In 1820, Oersted proved the identity of electricity and magnetism; but it remained for Faraday, in 1831, by his great discovery of induced currents, to render practicable the application of electricity to the production of good artificial light. It was not, however, until 1853, that the magneto-electric machine was actually applied to the purpose; and, in 1857, the first great practical trial took place, when Faraday had the satisfaction of seeing his conception carried into effect. This trial of Holmes' machine resulted in the E. L. being introduced into the South Foreland light-house on 8th Dec., 1858, and later the light was adopted at Dungeness. The French government adopted the light for two light-houses near Havre, in 1863.

The problems to be solved in the production of E. L., are to supply a constant and equal current (which battery electricity does not yield), and to provide a form of electrode which will not cause the light to blink or go out by wasting away. The first generating machines were "magneto-electric," revolving coils in front of permanent steel magnets (or contrariwise, revolving magnets in front of coils), but some later machines are "dynamo-electric," based on a discovery simultaneously made by Werner Siemens, Varley, and Wheatstone, that by revolving coils in front of soft iron electro-magnets, the residual magnetism in the iron would gradually be augmented, dynamic force being thus converted into electricity. The currents created by machines of either sort are alternate, but where, as in the case of some forms of lamp, the current must proceed in one direction, the alternate currents are made continuous by the use of a commutator. There are a large number of machines in use for generating currents for producing the E. L.; and for details reference may be made to Shoolbred's *Electric Lighting* (1879).

The invention of methods of using this powerful light received a great stimulus in 1876, when Jablochkoff's "candle" was invented. This electrode consists of two carbon pencils, $\frac{3}{16}$ inch in diameter, separated by a narrow strip of kaolin or plaster of Paris. The current passes alternately up each carbon, forming the arc at the extremity of the candle, the alternate currents causing each point to be in turn positive and negative, and thus to waste equally. The "Wilde candle" has no separating medium, the inventor having found that the light would run to the points spontaneously. By means of a magnet introduced into the circuit, the points are drawn separate when the current passes, and the light springs into existence. Should the light go out, the pencils fall together, and as the circuit is thereby completed, the points are at once separated again and the light is re-established. Rapieff's candle has the same merit of spontaneous lighting and regulation.

One of the most successful endeavors to solve the question of regulation of the light produced from the "arc" is the Wallace lamp. In this apparatus two carbon plates slide in a vertical frame. A rod extends from the upper plate by means of which it is drawn up on the passage of the current, and the light springs out at the point between the plates that occupies the proper position. When this point wastes, the light travels to another, passing thus slowly backwards and forwards along the carbons. It is claimed for this lamp that it will burn continuously for 100 hours, and by its durability it has solved one difficulty in the production of the electric light. The Serrin, Lontin, and Rapieff lamps are different arrangements for the production of light by means of the "arc," the adjustment of the carbons being effected by a combination of wheels and magnets through an electro-magnet.

The upper rod bearing a carbon pencil rests upon a second pencil, but, upon the passage of a current, it is raised by an electro-magnet which separates the carbons the distance necessary to produce the "arc."

When the carbons waste so that the light goes out, the magnet fails to act, the points come together, and the original process is repeated. The interval is so short, that only an almost imperceptible blink was seen in this lamp. In the later lamps great steadiness has been achieved.

The above described lamps and candles produce light in the form of the "voltaic arc," but a number of lamps have been produced which work entirely by incandescence of the electrodes. Werdermann's lamp produces light by the incandescence of a pencil of carbon pressed against a block of the same material, the latter forming the negative pole. In Reynier's lamp, a fine rod of carbon presses on a disk of carbon placed vertically and free to rotate. Edison's lamp depends for its action on the incandescence of fine particles of iridium, ruthenium, or other metal, held in solid form by magnetic oxide of iron or other substances not easily fused. The question of subdivision of the

light is still to be solved. To produce the current, a very steady engine is required, the endeavor to drive an electric machine by a large engine at Woolwich arsenal having shown that an engine on which the strain varies by machines being thrown into or out of gear does not give satisfactory results. During the year 1878, great progress was made in the adaptation of the electric light to street and workshop illumination; but it remains dearer than gas, and cannot at present (1879) be looked on as further than the stage of successful experiment.

ELECTRIC LIGHT (*ante*). The machines which are now used for generating the light-producing current are described in the article MAGNETO-ELECTRIC MACHINE. The more recent inventions of electrodes for producing light are those of Jablochkoff, Lodyguine, Kohn, Sawyer, and Edison. The first of these produces the light by the electric arc; the others by the incandescence of some refractory substance, as carbon or platinum.

The principal difference between the Jablochkoff light and the ordinary arrangement with carbon points is in a provision by which the current is reversed from time to time so that the more rapid consumption of the positive electrode is made to take place with one and the other point alternately. When the apparatus is started, there is also a slight bridge of carbon between the two points through which the current passes before the arc is established. The carbon rods are placed parallel and near together, so that a uniform distance may be maintained during their consumption. A pair of carbon points constitutes a "candle," and four candles are usually placed in a globe of opalescent glass. Each candle burns about one hour and a half, so that the set of four will give light about 6 hours, the change of electric action from one candle to another being accomplished by an automatic switch. The motive power required in the Jablochkoff lamp is about one-horse power applied to a magneto-electric machine for each candle, and each such candle is said to have a light value of 700 standard candles; but this, from the absorption of light by the opalescent glass, is reduced to that of 300 candles. In 1873, M. Lodyguine, a Russian as well as Jablochkoff, invented a lamp which gave light by rendering carbon incandescent by the electric current. A portion of the conducting rod of carbon was made much thinner than the rest, so that the increased electrical resistance in that part would cause it to become intensely incandescent. The carbon rod was inclosed in a glass vacuum chamber, but the apparatus was not practically successful, as the carbon wasted too rapidly, and required too frequent replacement within the vacuum chamber. In 1875, M. Kohn of St. Petersburg patented an arrangement intended to obviate this difficulty by a device having the same object as that in the Jablochkoff lamp, viz., to supply the place of the consumed carbon with a new piece. This lamp has been used with considerable success. The Sawyer lamp has the following characteristics: It employs the resistance of a small piece of carbon, placed in an air-tight glass cylinder filled with pure nitrogen, which, being a non-supporter of combustion, protects the carbon in a manner like that of a vacuum, the advantage claimed being that it is easier to keep a vessel full of pure nitrogen than to maintain a vacuum, because of the equality of the inward and outward pressure. The heat produced is prevented from reaching the mechanism at the base of the apparatus by having the copper standards present a great radiating surface. Diaphragms are also placed so as to cut off much of the downward heat rays, and a switch device is employed to prevent the too sudden turning on of the current, and thereby prevent crumbling by too sudden heating.

The experiments of Mr. Edison on the electric light have been in progress about two years, in which time he has used various substances for the incandescent material. He commenced with platinum, and employed a device by which the galvanic current would be reduced when the metal approached the melting point. This device consisted chiefly in placing within the fine platinum spiral a rod of the same metal which would be moved, on the principle of the pyrometer, one way or the other by a lever, and thus cool by its presence the incandescent spiral when it became too hot. But this device did not prove successful. Another arrangement employed heated air acting upon a diaphragm as the regulating power. The various metals which he used soon became oxidized and rendered useless. He then gave his attention to perfecting the vacuum employed by Lodyguine in 1873. Edison's platinum lamp as perfected consists of a long coil of platinum coated with calcined magnesia, supported by a platinum rod within a glass vacuum tube, which rests upon a metal frame containing the regulating apparatus. It is claimed that Edison has produced a vacuum more perfect than any other, so that only one millionth of an atmosphere remains. His attention was called from the use of platinum to that of small threads of carbon, made by charring cotton thread in a vacuum with the electric current. Light of great intensity was obtained in this way. He experimented with various forms of woody fiber, but finally found that nothing gave more satisfactory results than charred paper. Bristol card-board cut in the shape of a small horse-shoe, the strips being about 2 in. long, and an eight of an inch wide, and laid upon one another in an iron mold, being separated by tissue-paper. When the mold is packed, it is placed in an oven and gradually heated to 600°; afterwards, in a furnace, to a white heat. The carbonized product is then care-

fully removed and placed in a small glass globe, and made the resisting portion of the galvanic circuit; the globe is then exhausted and sealed air-tight.

ELECTRIC LOOM. See WEAVING (*ante*).

ELECTRIC TELEGRAPH. See TELEGRAPH.

ELECTRO-CHEMICAL ORDER OF THE ELEMENTS. When two metals are placed in contact and immersed in a solution capable of acting on one of them, an electric current is produced, positive electricity passing from the metal acted on, through the liquid, to the metal unacted on. See GALVANISM. The former metal is said to be *electro-positive* to the latter. By experimenting with different pairs, we can arrange the metals in electro-chemical order. This order depends upon the readiness with which the metals are acted upon by the solution, and is not the same for all solutions.

The following is the electro-chemical order of the more common metals, the liquid being dilute sulphuric or hydrochloric acid: Sodium, magnesium, zinc, iron, copper, silver, platinum. When a compound of two elements is electrolyzed (see GALVANISM), the electro-positive element appears at the negative electrode, and the electro-negative element at the positive electrode. It is impossible to make a single table of the electro-chemical order of the elements, as this is not the same under all circumstances, but it may be generally stated that oxygen is the most electro-negative element, and that next to it are the elements chlorine, bromine, fluorine, sulphur, etc., which form stable compounds with the metals.

ELECTRO-DYNAMIC ENGINE. See MAGNETO-ELECTRICITY and MAGNETO-ELECTRIC MACHINE, *ante*.

ELECTROLY'SIS, or ELECTRO-CHEMISTRY. See GALVANISM.

ELECTRO-MAGNETISM. See MAGNETISM and MAGNETO-ELECTRIC MACHINE.

ELECTRO-MET'ALLURGY. Within the last few years many advances have been made in the art of electro-metallurgy. Usually in electroplating, the silver presents a dull appearance when drawn out of the trough, requiring to be polished by a burnisher and a scratch-brush. If, however, bisulphide of carbon be added to the bath, or, better, if the article be dipped into a bath containing this liquid after immersion in the usual solution of silver, a thin but hard and bright layer of silver is deposited on the main layer, brilliant enough to do without polishing. There are certain difficulties in the process which render it only applicable in some circumstances.

Since 1869, the coating of other metals by an electro-deposit of nickel has been successfully carried out on a commercial scale, and is becoming extensively practiced both in England and the United States. It is usually deposited from a solution of sulphate of nickel neutralized by ammonia. Nickel has the hardness of iron, and though it lacks the beautiful color of silver, it has nevertheless an agreeable grayish-white color, and does not tarnish like silver in impure air, besides being only about one fifth part of its price. Numerous articles of iron, steel, brass, and German silver for household use, but especially for ships and hotels, have been plated with nickel in recent years.

Very beautiful electrotype copies of art objects can now be made of iron, and even, it is said, of steel. As a consequence of this, the art of engraving on steel will soon cease to be practiced, as copper-plates, which are less costly to engrave, can now be coated with an electro-deposit of iron which can be renewed at will; thus practically yielding an indefinite number of prints. In the same way engraved zinc plates can be coated with copper, in cases where a lesser number of impressions are required.

Attempts have often been made to coat iron with an electro-deposit of an alloy such as brass, bronze, or German silver, and with all of these it has been attended with more or less success. The difficulty lies in getting the solutions of two metals to be of exactly equal conducting power. By employing a solution containing both the oxides and the cyanides of copper and zinc, along with some tartrate of ammonia, a very even and compact deposit of brass can be obtained.

There is a process now in use for purifying impure or blister copper by electrolysis. The blister copper is cast into plates; these are placed in a solution of sulphate of copper, and form the anodes or positive poles of a battery. Particles of pure copper, by the action of the electric current, separate themselves from the crude plate of pimple metal, and attach themselves to the opposite or negative pole. By this means plates of pure copper are obtained, provided that the blister-copper contained no metals which will deposit along with it. The impurities fall down as a residue.

It sometimes happens that iron ores are found mixed with the ores of copper or zinc in the state of sulphides. In such a case there is a difficulty in separating them by the ordinary ore-dressing processes, owing to their being of nearly the same specific gravity. If, however, the iron ore happens to be magnetic, or can be changed into the black oxide by roasting, then its particles can be conveniently extracted from the mixture by electro-magnets.

The making of large copper or "bronze" statues by electro-deposit instead of by casting, is another department of the art which has made great strides. Messrs. Elkington have produced many statues in this way from 6 to 13½ ft. high. One of the earl of Eglinton weighs two tons. There is a trough or deposit-tank at the works of this cele-

brated firm, 15 ft. long, 9 ft. wide, and 9 ft. deep, that will contain 6,600 gallons of the copper solution.

The French are also making great progress in the art. M. Oudry has taken electrocasts of the bas-reliefs on Trajan's column at Rome, covering 700 sq. yards. He has also coated many thousands of the iron lamp-posts of Paris with copper by electrodeposit, as well as numerous fountains, etc., producing most of the good effects of bronze at a much smaller expense. This process of coating exposed iron with copper is not so much used as it might be. Few persons have any idea of the large extent of surface which even one halfpenny worth of copper will coat when deposited by the action of a galvanic battery from its solution either in the cyanide or chloride of potassium. See GALVANISM.

ELECTRO-MOTIVE MACHINES. See MAGNETO-ELECTRICITY.

ELECTROPHONE, an instrument devised by Dr. Strethill Wright for producing sound by electric currents of high tension. In its simplest form, the electrophone consists of two metallic plates separated by a sheet of cartridge-paper, the whole being closely pressed together by a heavy weight or screw. Such an instrument, when its plates are connected with the terminals of a small induction-coil, forms a sonorous condenser, the note of which varies with the rapidity of action in the electrotome or contact-breaker. The more complicated electrophone communicated to the royal Scottish society of arts, 25th April, 1864, by Dr. Wright, is composed of four curved plates of the thinnest sheet-zinc, each 2 by 4 ft., and each separated from its neighbor by a double layer of imitation silvered paper, the silvered sides being in apposition to the zinc. The first and third, and second and fourth plates are connected by fine wires, which also connect the instrument with the induction-coil. When this instrument is connected with a small coil, the terminals of which afford a spark almost inaudible, it becomes charged and discharged with each impulse of current, each charge being attended by a sonorous tap given out by the whole mass of metal thrown into vibration, and the rapid succession of taps producing a prolonged trumpet-note, the power of which may be increased by adding battery-power to the coil. The electrophone has been recommended by its author for use as a telegraphic relay capable of giving two or four signs with a single wire, with the advantage over other relays that perfection of contact was not necessary to its working. Fig. 1 shows the mode of working the electrophone as a double relay with four signals and the galvanometer of Thomson; A represents the needle of the galvanometer, B and C the wires communicating with an electrophone. When the needle is deflected to the right, it falls on the points B and C, and sounds the electrophone through B, A, C. The signals are produced by long and short contacts, as in the code of Morse. The second set of signals are produced by the reversal of the line-current, which throws the needle on the points of the arrangement D connected with a second electrophone of different tone. The electrophone has been employed as a lecture table instrument to report to a large audience results of processes which can only be rendered sensible by the most delicate galvanometric apparatus. Fig. 2 shows the adaptation of the electrophone to the galvanometer. AB represents the needle of the galvanometer suspended by a silk fiber, C; D is a small vessel of mercury communicating by a fine wire with the center of the needle; while a similar wire, attached to the end of the needle B, dips into the curved trough EF, containing distilled water. The wires inserted into D and F connect the coil with the electrophone, the current passing through F, E, B, D. When the needle is deflected, the tract of water between E and F is shortened, and the electrophone gives forth a gradually increasing sound. By a delicate system of levers attached to the wrist, as in the sphygmograph (q.v.), the rhythm and character of the human pulse, and its variation in disease, may be indicated to the class by the physician. Further, the electrophone may be adapted to the telephone by making the telephone membrane act the part of a make-and-break for the current circulating in the primary wire of induction-coil. This can easily be done by leading the current through the membrane, and through a spring carrying a platinum point, which presses lightly against a piece of platinum attached to the center of the membrane. If the sounds uttered into the telephone be sufficiently strong to make the membrane so to vibrate as to cause actual separation between the platinum surfaces, they will be reproduced with great loudness in the electrophone; but if, as in the case of speaking, they be merely able to cause variations of pressure at the surfaces, they will be but imperfectly heard. Hence the electrophone succeeds best with singing (see TELEPHONE), and a song gently sung in one place may be repeated in trumpet-tones in another hundreds of yards distant.

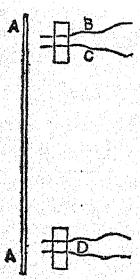


FIG. 1.

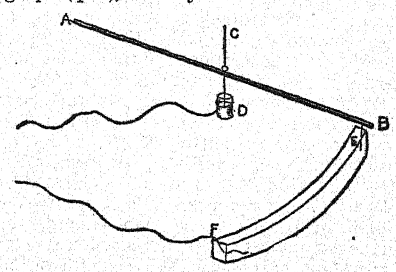


FIG. 2.

ELECTROPH'ORUS. This generally consists of a tin mold filled with shell-lac, and a movable metal cover, with a glass handle. The shell-lac is poured in when melted, and it is mixed with some other substance, to make it less brittle. Five parts of shellac, one of wax, and one of Venice turpentine, is given as a good mixture. When used, the surface of the cake of shell-lac is smartly beaten with a cat's fur or foxtail. The cover is then put on, and touched with the finger, which receives a slight spark of − electricity, just before contact takes place; and after the finger is removed, the cover, when lifted by its insulating handle, gives a brisk spark of + electricity to anything presented to it. This can be repeated for several minutes without any apparent exhaustion of the source of electricity; and in dry weather, sparks can be got in this way hours, and frequently days, after the cake has been beaten.

The action of the E. may be thus accounted for. When the surface of the cake of shell-lac is beaten, the friction excites − electricity on it. This acts inductively all round, but the tin mold being the nearest conductor, and shell-lac a good dielectric, the induction becomes concentrated on it, + electricity becoming fixed on the side next the shell-lac, and − electricity being sent to the ground. The − electricity of the upper surface of the shell-lac is thus fixed by the + electricity of the mold. When the cover is put on the cake, the contact between the two is not sufficient to allow the latter to communicate its charge to the former. The cover is thus acted on inductively, not conductively. The − electricity of the cake, then, has the choice of two channels for its induction, either through the cake to the mold, or through a very thin film of air to the cover. The latter, from its offering so short a passage through the dielectric, has the preference, and the inductive action of the charge is diverted from the mold to the cover, and the + electricity on the other side of the cake is thus liberated and lost in the ground. The cover being strongly polarized, + electricity is induced and fixed on its lower surface, and − electricity on its upper, this last being transmitted to the ground by the finger. When the finger is withdrawn, and then the cover, the + electricity of the latter is free to discharge itself by spark, and inductive action again takes the direction of the mold, once more attracting + electricity to it. The induced polarity of the cover is attended with no loss to the charge of the shell-lac, which can thus continue to act with the same efficiency. The loss of electricity that all charged bodies experience in air, and especially when moist, at length discharges the cake, but this takes place all the less readily, that when the electricity is not needed to act on the cover, it is kept bound by the + electricity induced by it in the mold. In order that the + electricity of the mold should have liberty, so to speak, to come and go, the E. must not be insulated; and when it is so, the action on the cover is feeble, if at all perceptible.

ELEC-TROPLATING—ELECTRO-TYPE. See GALVANISM.

ELECTROTYPE, PHOTOGRAPHIC. Much thought and labor have been expended in producing a relief-plate to take the place of wood-engraving, and various methods of etching on metal by the aid of photography have been brought to light. The earlier of these never were successful, because after the acid has eaten or etched below the surface protected by the asphaltum, there is nothing to prevent it from undermining the lines, as the acid will eat in one direction as well as another, thus weakening them to such an extent that they often break down in printing. With the gelatine process, the gelatine must be of a thickness compatible with the depth desired A gelatine of this thickness will become nearly, if not quite, insoluble before it is dry, through the action of bichromate alone. Also the color of the gelatine, after the bichromate has been added, is such as to prevent the action of light from penetrating to the proper depth in the time during which it can be exposed. These are the almost insurmountable reasons why a relief-plate in gelatine has not been obtained till the advent of a new process, called photo-electrotype. W. H. Mumler, of Boston, Mass., has now succeeded in overcoming these obstacles. After printing upon his gelatine, through a negative, the necessary time to secure all the details, the parts unaffected are dissolved away to a slight depth. The interstices are then filled with a black paste, when it is again exposed to light; the soluble parts that were protected by the opacity of the negative in the first printing are now protected from the action of light by the black paste that covers them. The second exposure may be continued for a length of time sufficient to allow the light to penetrate its entire depth; and the action of light being to render the gelatine insoluble, it can readily be seen that the protected parts can be dissolved away to the depth to which the light has penetrated. The gelatine relief is then placed in a drying closet for a few hours, when it becomes as hard as horn. From this an electrotype is taken in precisely the same manner as from a wood-cut. It is then mounted on mahogany blocks, type high, when it is ready for the press. The result is an electrotype plate with a surface as smooth as polished plate-glass, and a depth far exceeding that of ordinary wood-cuts. See PHOTOGRAPHIC ENGRAVING.

ELECTRUM is a term used to designate native gold as it is associated with silver. It is also applied to amber.

ELECTUARY (Lat. *eligere, electum*, I make choice), a form of medicinal preparation in which the remedy is enveloped or suspended in honey or syrup, so as to make a mixture of thick semi-fluid consistence.

ELEGIT, ESTATE BY, the right in lands which is enjoyed by one who has acquired the land under writ of elegit (q.v.).

ELEGIT, WRIT OF, a writ whereby a creditor in England can seize the lands of his debtor in satisfaction of his claim. Before the reign of Edward I., a creditor could not enforce a claim of debt against the lands. But by statute of Westminster the second, 13 Edw. I. c. 18, it was enacted that the goods and chattels of the debtor should first be appraised, and if these were not sufficient, that the half of the freehold lands of the debtor should be delivered to the creditor, to be held by him until the debt was paid out of the rents and profits thereof. By 1 and 2 Vict. c. 110, the whole of the lands, including copyhold and customary lands, are made subject to the debt. A creditor who has seized the lands, is not entitled to take the person of his debtor; for, as imprisonment for debt is practically abolished, except where fraud was used, this and *fieri facias* (q.v.) are the only remedy of creditors.

ELEGY (Gr. *elegeia*), according to its derivation, signifies, exclusively, a song of lamentation, but the term was employed at an early period by the Greeks to designate any poem written in distiches. The alternation, peculiar to this measure, of the hexameter, or strictly narrative verse, with the more fiery pentameter, gives to this whole species of poetry its individual character, which consists in the connection of subjective feelings and emotions with external incidents or objects. The E., therefore, can often be chiefly, but never altogether narrative. The effect of the measure is further shown in the circumstance, that earnest, long-sustained feelings, rarely violent passions, are expressed in the elegy. Of the numerous elegies of the Greeks, few have come down to us. Those still extant consist partly of encouragements to patriotism, as in Callinus and Tyrtæus, and partly of lessons of practical wisdom, as in Solon and Theognis. Sometimes also it expressed yearning desire or mild sorrow, or amorous complaints. This was especially the case at Alexandria. Among the Romans, Catullus was the first good elegiac writer; after him came Propertius, Tibullus, and Ovid. Tibullus, in particular, brought the erotic E. to its highest perfection. All are marked by the absence of political or moral feeling. They lived at a time when it was dangerous to express the one, and unfashionable to express the other—viz., the Augustan age. In modern times, the term E. is applied in England to any serious piece where a tone of melancholy pervades the sentiments, whether grief is actually expressed or not; as, for example, Gray's "*Elegy*, written in a country church-yard."

ELEGY, in music, is a composition depicting feelings of mourning, sadness, longing or ardent desire, and love.

ELEMENTAL SPIRITS, beings who, according to the popular belief of the middle ages, presided over the four "elements," living in and ruling them. The E. S. of fire were called salamanders; those of water, undines; those of the air, sylphs; and those of the earth, gnomes. These imaginary beings play a part in Pope's mock-heroic poem, *The Rape of the Lock.*

ELEMENTS, in astronomy, are those numerical quantities, and those principles deduced from astronomical observations and calculations, which are employed in the construction of tables exhibiting the planetary motions. They include the greatest, least, and mean distances of the planets from the sun, the eccentricities of their orbits, their mean motions, daily and annual, with the motions of their aphelia, and the inclinations of their orbits to the ecliptic; their masses and densities, etc. The E. of the different planets and of their satellites will be found under their names. The reader will find tables of the E. of all bodies in our system in most books on astronomy. See in particular Herschel's *Elements of Astronomy.*

ELEMENTS, CHEMICAL. The word elements has a very different signification in modern science from what it once had. The earliest of the Greek philosophers assumed either a single element, or several, the modifications and combinations of which they held to give rise to all the things that we see. The most common assumption was that of four elements —fire, air, water, and earth. This corresponds to the four forms under which modern science considers matter as existing—viz., imponderable, gaseous, liquid, and solid; while by elements are understood the simple component ingredients of bodies under whatever form they exist. Neither air, water, nor earth are elemonts in this sense, for they can be decomposed into simpler ingredients, and fire is a combination of light and heat. It is not pretended that any of the substances called elements are absolutely simple, that is, contain only one kind of matter; but only that hitherto they have not been decomposed. The number of so-called simple bodies, or elements, recognized by chemists is 64, of which some have been known from ancient times, such as the metals gold, silver, lead, copper, tin, and mercury; others are of more recent date; whilst quite lately two new metallic elements have been added to the list—viz., cæsium and rubidium, both of which were discovered by prof. Bunsen of Heidelberg, by the aid of the new branch of practical chemistry named *spectrum analysis.* The elements are divided into two great classes—the *non-metals* and *metals.* The latter are the more numerous class, there being altogether 51, whilst the non-metals number only 13. The following table gives the names of the elements at present known:

TABLE OF THE ELEMENTARY SUBSTANCES.

Non-metallic.

Oxygen.	Boron.	*Selenium.*	Bromine.
Hydrogen.	Silicon.	Phosphorus.	Iodine.
Nitrogen.	Sulphur.	Chlorine.	Fluorine.
Carbon.			

Metallic.

Potassium.	*Yttrium.*	Silver.	*Osmium.*
Sodium.	*Erbium.*	Mercury.	Antimony.
Lithium.	*Terbium.*	Copper.	Tin.
Cæsium.	*Cerium.*	Bismuth.	*Tungsten.*
Rubidium.	*Lanthanum.*	*Cadmium.*	*Molybdenum.*
Barium.	*Didymium.*	*Uranium.*	*Vanadium.*
Strontium.	Chromium.	Gold.	*Tantalum* (*Columbium*).
Calcium.	Zinc.	Platinum.	*Indium.*
Magnesium.	Manganese.	*Thallium.*	*Niobium.*
Aluminium.	Nickel.	*Palladium.*	*Titanium.*
Beryllium (*Glucinum*).	Cobalt.	*Rhodium.*	*Tellurium.*
Zirconium.	Iron.	*Iridium.*	Arsenic.
Thorium.	Lead.	*Ruthenium.*	

The more rare elements are printed in *italics*. Although the classification adopted above is a convenient one for the study of the elements, yet there is no decided line of demarkation between the metallic and non-metallic (otherwise called metalloid) series. The metals are generally recognized (1) by their power of reflecting light, as exhibited in the luster of burnished gold, and even in ordinary mirrors, which owe their power of reflecting light to the amalgam of the metals mercury and tin, present on the glass; (2) by their power of conducting heat; and (3) by their ready transmission of electricity. The non-metals or metalloids are regarded as not possessing all these three attributes. The non-metals carbon and silicon, however, in certain forms conduct electricity, whilst the metals arsenic and tellurium very closely resemble the metalloids in many of their properties. In the combinations of the various elements with each other, the non-metals constitute the electro-negative ingredient, and, as a rule, are insulators in the galvanic current; whilst the metals form the electro-positive element of the combination, and are conductors of the electric fluid. Again, in their combination with oxygen, the non-metals form more or less powerful acids, whilst the metals produce more or less powerful bases. At ordinary temperatures, five of the E. are gaseous—viz., oxygen, hydrogen, nitrogen, chlorine, and fluorine; two are liquid—viz., bromine and mercury; whilst the remaining 57 are solid.

ELEMENTS, CHEMICAL (*ante*). See CHEMISTRY, *ante*, and ATOMIC WEIGHTS, *ante*. Progress in chemical science presents the names of several substances which claim admission to the list of elements, with varying degrees of confidence. All are constituents of rare minerals, and none of them are likely to acquire much importance in practical affairs. The small quantities yet found have made the discussion of their oxygen compounds very difficult, and leave their appropriate atomic weights liable to different determinations.

The following list gives their status as known in Mar., 1880:

Name.	Symbol.	At. w't.	Discoverer and Remarks.
Terbium.....	Tb.	99.	Mosander in 1843, but discredited till recently, when shown to exist by M. Delafontaine.
Gallium.....	Ga.	69.9	Lecoq de Boisbaudran. White, sp. gr. 5.93.
Decipium.....	Dp.	114 171?	M. Delafontaine. The numbers 114 and 171 depend upon whether the oxide is DpO or Dp_2O_3.
Phillipium.....	Pp.	82 123?	M. Delafontaine.
Ytterbium.....	Yt.	116? 173.01	M. Marignac. L. F. Nilson thinks to show the atomic weight to be 132.
Scandium.....	Sc.	Undetermined.	L. F. Nilson in a Scandinavian mineral.
Norwegium.....	Ng.	145.9	Teleff Dahll, in copper-nickel, color white, melts at 350°C. Sp. gr. 9.441.

Other reported elements are: Mosandrium, a mixture of known metals; Ilmenium, probably a similar mixture; Neptunium, insufficiently characterized; Davyum, not authentic; Holmium is Phillipium; Thulium and Ouralium need confirmation. The revised weight of Thorium is 231.5 (oxide, TiO_2); Yttrium, 58.5 or 88.3; Erbium, 106 or 159; Indium, 113.4 (oxide In_2O_3).

E'LEMI, a fragrant resinous substance, obtained from different species of the natural order *amyridaceæ*. It was formerly brought chiefly from Egypt or Ethiopia, and was referred to a tree called *amyris elemifera*. Part of the E. of commerce is now brought from America, and is obtained from trees of other genera, but of the same natural order, particularly *icica icicariba*, which grows in Brazil and other warm parts of America. In dry weather, incisions are made in the bark, from which the resinous juice flows abundantly, and hardens in the sun. It is collected once a day, and put into casks. It is at first soft and unctuous, but becomes hard and brittle by age. *Elaphrium elemiferum* is believed to yield the greater part of the E. of Mexico. E. is usually in large, pale-yellow, semi-transparent masses, fragile, softening by the heat of the hand, with a smell somewhat resembling that of fennel. It is soluble in alcohol, except a white crystallizable residue, which is very light, inodorous, and tasteless, and which is called *elemine*. The properties of E., however, chiefly depend on a volatile oil, which may be obtained from it by distillation. E. is used in the preparation of stimulant plasters and ointments.

ELEPHANT, a geographical term of obvious origin, indicates various localities in Asia and Africa.—1. Elephant point, a promontory of Pegu, in Further India, marks the w. extremity of the mouth of the Rangoon, the most easterly arm of the Irrawaddy. It is in lat. 16° 28′ n., and long. 96° 25′ east.—2. Elephant bay, an inlet of the Atlantic, on the coast of Benguela, s.w. Africa, in lat. 13° 14′ s., and long. 12° 33′ e., has excellent anchorage, but no fresh water.—3. Elephant island, in Senegambia, is about 100 m. up the Gambia.—4. Elephant river, in the Cape Colony of South Africa, enters the Atlantic after a course of 140 m., about lat. 31½° s., and long. 18° east.

ELEPHANT (Gr. *elephas*), a genus of quadrupeds, of the order *pachydermata* (q.v.), and of the section *proboscidea*. Elephants are the largest existing land animals. The ordinary height at the shoulder is about 8 ft., but sometimes exceeds 10 feet. The weight of a large E. is about five tons, the body being very bulky in proportion to its height. To sustain this weight, it is furnished with limbs of colossal thickness and strength, which are also remarkably straight, each bone resting vertically on that beneath it. From the appearance of inflexibility presented by the limbs, arose the notion prevalent among the ancients, and throughout the middle ages, that the limbs are destitute of joints, and that consequently an E. cannot lie down to rest like another quadruped, and if it were to lie down, could not rise again, but always sleeps standing, or leaning against a tree. It is indeed true that the E. often sleeps standing, and when fatigued, falls asleep leaning against a rock or tree, against which it may have been rubbing itself. The flexibility of the limbs is, however, sufficient to permit elephants to run with speed nearly equal to that of a horse, to indulge in playful gambols, and to ascend and descend steep mountains. Elephants are more sure-footed and serviceable than either horses or mules, in difficult mountain roads. On the very steepest declivities, an E. works his way down pretty rapidly, even with a *howdah* and its occupants upon his back, his chest and belly on the ground, and each forefoot employed in making a hole for itself, into which the hind-foot afterwards follows it, and to which the weight may be trusted, that another step may be ventured with safety. In lying down, the E. does not bring his hind-legs under him, like the horse and other quadrupeds, but extends them backwards (as man does when he assumes the kneeling position), an arrangement which, "by enabling him to draw the hind-feet gradually under him, assists him to rise almost without a perceptible effort." The E.'s pace, when exceeding a walk, is neither a trot nor a gallop, which would be too violent a motion for its conformation and huge body, but a sort of shuffle, the speed of which is increased or diminished without other alteration. The E. is incapable of springing like the deer, horse, and other animals which have the bones of their shoulders and hocks set at an angle.

The head in elephants is large; the neck is short and thick, the long flexible proboscis compensating both for the shortness of the neck, and for the inflexibility caused by the largely developed processes of its vertebræ, and enabling the animal readily to reach objects on the ground, or to a height of several feet above its head, or on either side. A great extent of bony surface in the head affords attachment for muscles destined to move and give power to the proboscis or trunk. This extent of bony surface is provided in a remarkable manner, which at the same time makes the head, heavy as it is, lighter in proportion to its bulk than is usual in quadrupeds; a great space separating the internal and external tables of all the bones of the skull, except the occipital bones, so that the space occupied by the brain is but a small part of the whole head. The space between the tables of the bones is occupied by cells, some of which are 4 or 5 in. in length; others are small, irregular, and honeycomb-like; "these all communicate with each other, and through the frontal sinuses with the cavity of the nose, and also with the tympanum or drum of each ear; consequently, as in some birds, these cells are filled with air." The huge and extraordinary bones of the skull, besides affording attachment for muscles, afford mechanical support to the tusks.

The nasal bones of the E. are scarcely more than rudimentary; but the tapering proboscis, to the very extremity of which the nostrils are prolonged, is nearly 8 ft. in length. Besides the great muscles connected with it at its base, it is composed of a vast multitude of small muscles variously interlaced, but chiefly either longitudinal, and divided into successive arcs, of which the convexity is outwards, or transverse, and

radiating from the internal to the external membrane. Cuvier states the number of muscles having the power of distinct action as not far short of 40,000. The trunk can be coiled around a tree, and employed to tear it from its roots; it is a formidable weapon of offense or defense, and is far more employed in this way than the tusks, even by those elephants which have tusks of great size; its extremity can be wound around a small handful of grass or a slender branch; it is even capable of plucking the smallest leaf, or of lifting a pin from the ground. To fit it for such actions as those last mentioned, and for many such as might be performed by a hand, it is furnished at the extremity with what may be likened to a finger and thumb; on the upper side, an elongated process—strong, soft, and flexible, like the rest of the trunk, and endowed with the most delicate sense of touch—on the under side, a kind of tubercle against which this process may be pressed. All the food of the E. is gathered and conveyed to the mouth by the trunk: by means of the trunk, also, it drinks, sucking up into it a quantity of water sufficient to fill it, and then discharging the contents into the mouth. Valves at the base of the trunk prevent the water from going too far up the nostrils. The trunk is constantly employed by elephants in providing in many ways for their comfort or enjoyment, as in throwing dust over their backs, or in fanning themselves and switching away flies with a leafy branch, two practices to which they are greatly addicted. Their mutual caresses are also managed by means of the trunk, and through it they make a loud shrill sound, indicative of rage, which is described by Aristotle as resembling the hoarse sound of a trumpet, and from which this organ received its French name *trompe*, corrupted in English into trunk. With the trunk, also, they sometimes, when angry, beat violently on the ground.

The sense of smell is very acute in the E., as is also that of hearing. The ears are large and pendulous; the eyes are small.

Elephants have no canine teeth, nor have they any incisors in the lower jaw. The upper jaw is furnished with two incisors, which assume the peculiar character of tusks, and attain an enormous size, a single tusk sometimes weighing 150 or even 300 pounds. The tusks are, however, often imperfectly developed, 10 or 12 in. in length, and 1 or 2 in diameter. These stunted tusks are often used for such purposes as snapping off small branches and tearing climbing plants from trees. Those elephants which possess great tusks employ them also for such other uses as loosening the roots of trees which they cannot otherwise tear from the ground; or in a state of domestication, for such labors as moving great stones, and piling or carrying timber. A powerful E. will raise and carry on his tusks a log of half a ton weight or more. The tusks of the E. surpass in size all other teeth of existing animals, and are the largest of all teeth in proportion to the size of the body. They consist chiefly of that variety of *dentine* called ivory (q. v.), and continue to grow—like the incisors of the rodents, to which they are in some respects analogous—even when the animal has attained a great age, if not to the very end of its life. The young E. is at first furnished with deciduous incisors, which are shed between the first and second year, and are succeeded by the permanent tusks.—The molar teeth of the E. are developed in succession; and at least in the Indian E., never more than two are to be seen in the same side of a jaw at one time. The first molars cut the gum in about two weeks after birth, and are shed about the end of its second year. The sixth molars, which are also believed to be the last, are supposed to appear about the fiftieth year of the E.'s life. The molar teeth of the E. are remarkable for their great size, and for the extreme complexity of their structure, to which the nearest resemblance is found in some of the small rodents. They are composed of vertical plates of bony substance, separately enveloped in enamel, and cemented together by a third substance, called *crusta petrosa*, *cortical*, or *cement*, more resembling bone than enamel. Each succeeding tooth is not only more complex, but occupies a greater space in the jaw than its predecessor. Although formed from a single pulp, the molar tooth of an E. resembles an aggregation of teeth; and in the earlier stages of its growth, when the cement is not yet deposited, it seems as if many separate teeth were soldered together. As the surface of the tooth is worn down by mastication, the harder enamel is exposed in elevated ridges. The whole of a tooth is not in employment at once. From the peculiar manner of its growth, the anterior part begins to be employed, and to be worn away, whilst the latter part is still in process of formation.

The digestive apparatus of the E. is similar to that of the other pachydermata; but the stomach, which is of a very lengthened and narrow form, exhibits a peculiarity which assimilates it to that of the camel; the internal membrane, at the extremity beyond the cardiac orifice, forming thick wrinkles and folds, the broadest of which, and nearest to the gullet, seems to act as a valve, making that end of the stomach a reservoir for water, capable of containing about ten gallons; whilst a peculiar muscle, connecting the windpipe and gullet, enables the animal to open this reservoir at pleasure, for the regurgitation of the fluid, which is then sometimes received into the trunk, and squirted over the body, to free it from the nuisance of flies or the heat of a tropical sun.

The female E. has only two teats, situated between the fore-legs. The young suck with the mouth, and not with the trunk. They are suckled for about two years. The period of gestation is also nearly two years, and a single young one is produced at a birth.

The skin of the E. is very thick, of a dark-brown color, and in the existing species has scarcely any covering of hair. The tail does not reach to the ground, and has a tuft of coarse bristles at the end. The feet have in the skeleton five distinct toes, but these are so surrounded with a firm horny skin that only the nails are visible externally, as on the margin of a kind of hoof. The foot of the E. is admirably adapted for steep and rough ground, the protective skin which covers the toes allowing them considerable freedom of motion.

Only two existing species of E. are certainly known, the Indian (*E. Indicus*) and the African (*E. Africanus*), although differences have recently been observed in the E. of Sumatra, which may perhaps entitle it to be ranked as a distinct species. Elephants are found in all parts of Africa, from the Sahara southwards, where wood and water are sufficiently abundant; also throughout India and the south-eastern parts of Asia, and in some of the tropical Asiatic islands. They extends northwards to the Himalaya; and Chittagong and Tiperah vie with Ceylon in the superior excellence of the elephants which they produce. The Indian E. is distinguished by a comparatively high oblong head, with a concave forehead; whilst the African has a round head and convex forehead. The ears of the African E. are much larger than those of the Indian, covering the whole shoulder, and descending on the legs. A marked distinction of the two species is also found in the molar teeth; those of the Indian E. exhibiting *wavy parallel transverse ridges;* whilst those of the African species have the divisions of the crown of the tooth fewer, broader, and *lozenge-shaped.*

Elephants live in herds, not generally numerous, but several herds often congregate together in the same forest or at the same place of drinking. Each herd has a leader, generally the largest and most powerful animal. The leader seems to exercise much control over the movements of the herd; gives the alarm in case of danger, and seems to examine and decide for the whole herd as to the safety of proceeding in any particular direction. On account of his tusks, the leader is very often the animal against which the efforts of the hunter are directed; but the rest of the herd do their utmost to protect him, and when driven to extremity, they place him in the center, and crowd so eagerly to the front of him that some of them must often be shot ere he can be reached. A family resemblance is usually very visible among the elephants of the same herd; some herds are distinguished by greater stature, and others by more bulky form and stronger limbs; some by particularly large tusks, some by slight peculiarities of the trunk, etc. In the East Indies, distinctions of this kind have long been carefully noticed, and particular names are given to elephants according to them, some being considered as *high-caste,* and others as *low-caste* elephants. An E. which by any cause has been separated from its herd, seems never to be admitted into another, and these solitary elephants are particularly troublesome, in their depredations exhibiting an audacity which the herds never exhibit; they are also savage and much dreaded, whilst from a herd of elephants danger is scarcely apprehended. The E. is generally one of the most inoffensive of animals, although in a state of domestication, it shows, as is well known, a power both of remembering and resenting an injury.

The favorite haunts of wild elephants are in the depths of forests—particularly in mountainous regions—where they browse on branches, and from which they issue chiefly in the cool of the night to pasture in the more open grounds. They are ready to plunder rice or other grain-fields, if not deterred by fences, of which, fortunately, they have, in general, an unaccountable dread, even although rather imaginary than real. A fence of mere reeds will keep them out of fields, where, as soon as the grain is removed, they enter by the gaps of the fence, and may be seen gleaning among the stubble.

When the E. eats grass, "nothing can be more graceful than the ease with which, before conveying it to his mouth, he beats the earth from its roots by striking it on his fore-leg." A cocoa-nut is first rolled under foot, to detach the outer bark, then stripped of the fibrous husk, and finally crushed between the grinders, when the fresh milk is swallowed with evident relish. The fruit of the palmyra palm is another favorite food of elephants, and they seem to have an instinctive knowledge of the time of its ripening. Sugar-canes are also a favorite food; indeed, elephants are very fond of sweet things. Those which are brought to Britain are generally fed on hay and carrots. The amount of daily food necessary for the E. in a state of domestication may be stated, on an average, at about 200 lbs. in weight.

Elephants delight in abundance of water, and enter it very freely, often remaining in it for a considerable time and with great evident enjoyment. They sometimes swim with not only the body but the head under water, the only part elevated above it being the extremity of the trunk.

The habits of the African E. appear in no important respect to differ from those of the Indian elephant. It is the latter only that is at the present day domesticated; but it is certain that the African species was anciently domesticated, and the figures on many Roman medals attest it.

Elephants rarely breed in a state of domestication, although, a few years ago, the birth of an E. took place in the zoological gardens of London, an occasion of much interest not only to the scientific but to the general public. They are generally tamed within a few months after they are captured; some degree of severity being employed

at first, which, however, as soon as the animal has begun to respect the power of man, is exchanged for kindness and gentleness of treatment. Elephants intended for domestication are captured in various ways. It was formerly common to take them in pitfalls, but in this way they were often much injured. Another method frequently practised is by the aid of tame elephants. Male elephants chiefly are captured in this way, the decoy elephants employed being females, trained for the purpose. With these the hunters very cautiously approach the animal they mean to capture, and he generally permits them to come up to him, and is so pleased to make the acquaintance of the female, that he takes no notice of their riders and other human attendants. Two of the females take their places, one on each side of him, and whilst he is occupied with them, men, the profession of whose lives it is, and who display a wonderful expertness in the work, contrive to get beneath their bodies, and to pass ropes round the legs of the intended captive. His two hind-legs are fastened together by 6 or 8 ropes in the form of the figure 8, another rope keeping them tight at the intersections, and a strong cable with a running-noose is attached to each hind-leg. About twenty minutes are usually spent in fixing the necessary ropes, profound silence being maintained if the process goes on unobserved, or some of the other hunters distracting the attention of the E. from those who are engaged in this work; and when at last, becoming sensible of his danger, he tries to retreat, an opportunity is soon found of tying him, by means of the long cables which trail behind him, to some tree strong enough for the purpose. His fury then becomes ungovernable, and he makes violent and prodigious efforts to get free, throwing himself on the ground, and twisting himself into the most extraordinary positions. It is not until he has thoroughly exhausted himself, and begins to suffer severely from fatigue, thirst, and hunger, that the next steps are taken towards taming him and making him a willing servant of man.

Still more wonderful is the capture of a wild E., sometimes by not more than two hunters, who for this purpose will go into the woods, without aid or attendants, their only weapon a flexible rope of hide. With this they secure one of the E.'s hind-legs, following his footsteps when in motion, or stealing close up to him when at rest, or sometimes spreading the noose on the ground, partially concealed by roots and leaves, beneath a tree on which one of the party is stationed, whose business it is to lift it suddenly by means of a cord. When arrested by the rope being coiled around a tree, the E. naturally turns upon the man who is engaged in making it fast, but his companion interferes on his behalf, by provoking the animal; and thus not only is the first rope made fast, but noose after noose is passed over the legs, until all are at last tied to trees, and the capture is complete; upon which the hunters build a booth for themselves in front of their prisoner, kindle their fires for cooking, and remain day and night till the E. is sufficiently tamed to be led away.

But these huge animals are not always captured singly; whole herds are often taken at once. This is accomplished by means of an inclosure, towards which the elephants are driven by great numbers of men encircling a considerable space, and contracting the circle by slow degrees. Weeks, or even months, are spent in this operation, and at last the elephants, hemmed in on every side except the mouth of the inclosure, enter it, and the gate is immediately closed. The modes of constructing the inclosure are different in different parts of the east. Tame elephants are sometimes sent into it, and the captives are in succession made fast to trees there, in a way somewhat similar to that practiced in capturing single elephants.

The E. first became known in Europe from its employment in the wars of the east: "in India, from the remotest antiquity, it formed one of the most picturesque, if not of the most effective, features in the armies of the native princes." Elephants have been taught to cut and thrust with a kind of scimitar carried in the trunk, and it was formerly usual for them to be sent into battle, covered with armor, and bearing towers on their backs, which contained warriors. But the principal use of the E. in war is for carrying baggage, and for dragging guns. An E. will apply his forehead to a cannon, and urge it through a bog, through which it would be almost impossible for men and cattle to drag it; or he will wind his trunk round it, and lift it up, whilst horses or cattle drag it forwards. Elephants are used in the east for carrying persons on their backs, a number being seated together in a *howdah*, whilst the driver (*mahout*) sits on the E.'s neck, directing it by his voice and by a small goad. Elephants have always a conspicuous place in the great processions and state displays of eastern princes, and white elephants—albinos—are peculiarly valued. Elephants are also employed in many kinds of labor, and display great sagacity in comprehending the nature of their task and adapting themselves to it. In piling timber, the E. "manifests an intelligence and dexterity which is surprising to a stranger, because the sameness of the operation enables the animal to go on for hours disposing of log after log, almost without a hint or direction from his attendant."

Of the sagacity of the E., many interesting anecdotes are on record, as every reader of books of travels and of natural history knows. But Cuvier refuses, and apparently with justice, to ascribe to it a degree of sagacity higher than that of the dog. In a state of domestication, the E. is a delicate animal, requiring much watchfulness and care, although naturally it has a very long life, and instances are on record of extreme lon-

gevity in domestication, extending not only to more than one hundred, but almost to two hundred years.

The numbers of wild elephants, in some parts both of the East Indies and of Africa, are being gradually reduced as cultivation extends, and many are shot for no other reason than a desire to reduce their numbers, and put an end to their ravages on cultivated grounds. A reward of a few shillings per head was claimed for 3,500 destroyed in part of the northern province alone of Ceylon, in less than three years prior to 1848. It is for the sake of ivory that the greatest slaughter of elephants takes place. A ball of hard metal, skillfully planted in the eye, base of the trunk, or behind the ear, generally ends an E.'s life in an instant; and expert *sportsmen* have been known to kill right and left one with each barrel.

Fossil Elephants.—The E. makes its appearance in the pleistocene strata. Its near ally, the mastodon, whose remains are found associated with it, began life earlier; it has left its traces in miocene deposits. Ten species of fossil elephants have been described, the remains of three of which are found in Europe. The best known of these is the *elephas primigenius*, or mammoth, the tusks of which are so little altered as to supply an ivory which, though inferior to that of the living species, is still used in the arts, especially in Russia. Its tusks are, on this account, regularly searched for by "ivory hunters" in Siberia, where, in the superficial deposits of sand, gravel, and loam, the remains occur in enormous abundance. They are also found in similar strata all over Europe. In Britain, the localities that have supplied these remains are very numerous. They are especially abundant in the pleistocene deposits of the e. and s.e. of England. Woodward, in his *Geology of Norfolk*, calculates that upwards of 2,000 grinders of this animal had been dredged up by the fishermen off Happisburgh in thirteen years. The bone-caves also yield remains of this gigantic animal.

The mammoth truly belongs to the geological history of the world; it died out at the close of the period represented by the pleistocene beds. It is the only fossil animal that has been preserved in a perfect condition for the examination of man. In all other remains we have to deal with the hard portions only—the bones, teeth, scales, etc., and frequently only with fragmentary portions, requiring the skill of a Cuvier or an Owen to make from them an approximation to the perfect animal. But the mammoth has been preserved so that its flesh has been eaten by dogs, bears, and wolves. In 1799, a Tungusian, named Schumachoff, while searching along the shores of lake Oncoul for mammoth tusks, observed among the blocks of ice a shapeless mass, but did not at the time discover what it was. The heat of succeeding summers gradually melted the ice around it, and, in 1803, the mammoth fell on a bank of sand. In Mar. of the following year, the hunter visited it, cut off, and carried away the tusks, which he sold for fifty rubles. In 1806, Mr. Adams visited the locality, and examined the animal, which still remained on the sand-bank where it had fallen, but in a greatly mutilated condition. The Jakutski of the neighborhood had cut off the flesh to feed their dogs, and the wild beasts had almost entirely cleared the bones. The skeleton was, however, entire, excepting one of the forelegs, and some of the bones of the tail. Many of the bones were still held together by the ligaments and by parts of the skin. The head was covered with dry skin; one of the ears was well preserved; it was furnished with a tuft of hairs. Three fourths of the whole skin were procured, which was so heavy that ten persons found great difficulty in transporting it to the shore, a distance of 150 ft.; it was of a dark-gray color, and was covered with a reddish wool, and long black hairs or bristles. The wool was short, and curled in locks; the bristles were of different lengths, varying from 1 to 18 inches. Some of this covering still remained attached to the skin, but the great mass was entirely separated from it. Mr. Adams collected 36 lbs., although much of it had been destroyed from the dampness of the place where it had lain so long. The animal was a male, and had a long mane on the neck. The entire carcass was removed to St. Petersburg, where it is now preserved. The tusks were repurchased, and added to the animal. It measures from the fore part of the skull to the end of the mutilated tail 16 ft. 4 in.; the height to the top of the dorsal spines is 9 ft. 4 in.; the length of the tusks along the curve is 9 ft. 6 inches. Portions of the hairy covering have been brought to this country, and may be seen in the British museum.

Taking the teeth as exhibiting clearly a marked difference in the recent species, the mammoth is easily separated from both by its broader grinders, which have narrower, and more numerous, and close-set plates and ridges. The existence of the E. and other genera, whose representatives are now found only in the warmer regions of the earth, in the n. of Europe and Asia, led to the belief, that at the recent period in the world's history when they were its living inhabitants, a tropical temperature existed in the temperate zone, and stretched further n. towards the pole; but the discovery of this perfect animal showed that these huge elephants were adapted by their clothing to endure a cold climate, and by the structure of their teeth were able to employ as food the branches and foliage of the northern pines, birches, willows, etc. There are few generalizations more plausible at first sight than to predicate of an unknown species of a genus what is ascertained regarding the known members of the same genus. It required a striking case, such as that supplied by the discovery of the mammoth, to show clearly the fallacy of deductions which were almost universally received by scientific men not many years

ago, which still occasionally mislead, and which may even now be met with in some popular hand-books of science.

ELEPHANT. An order of the E. was instituted in Denmark, by king Frederick II. The badge was a collar of elephants towered, supporting the king's arms, and having at the end the picture of the Virgin Mary.

ELEPHANT, SEA, *Macrorhinus proboscideus*, also known as the ELEPHANT SEAL, the PROBOSCIS SEAL, etc., is the largest of the seal family (*phocidæ*), an inhabitant of the seas of the southern hemisphere. It is more than twice as large as an elephant, being sometimes 30 ft. in length, with a circumference of about 18 ft. at the thickest part, which is at the chest, immediately behind the fore-flippers or swimming paws; the body tapering towards the tail. The color is grayish, bluish gray, or more rarely blackish brown. The whole body is covered with very short hair, distributed in patches, giving it a spotted appearance somewhat like watered silk. The swimming paws are large and powerful; the fore-paws have five nails, the thumb-nail easily distinguishable from the others; the hind-paws have not even the rudiments of nails, but are beautifully constructed like the webbed foot of a bird, so as to expand, and increase the power of swimming. The true nail is very short, not more than 6 in. long. The head is larger in proportion than in many seals; the eyes are very large and prominent, with eyebrows of coarse hair; the whiskers are composed of very long and coarse spirally twisted hairs; there are no external ears; the canine teeth are remarkably large and massive, somewhat assuming the character of tusks. The nose of the males is very remarkable, being prolonged into a kind of proboscis of about a foot long, which, however, is not at all an organ of prehension, and, indeed, seems to serve no purpose whatever analogous to those which are served by the proboscis of the elephant, but in its ordinary state hangs flaccid on the face, becoming distended like the wattle of a turkey when the animal is roused to passion of any kind, and in particular presenting this distended appearance during the rutting season. At that season, also, the males have furious combats, the victor winning for himself a whole herd of females. When the proboscis is dilated, the voice of the sea-elephant, which usually is like the lowing of an ox, is completely changed, and becomes a loud and extraordinary gurgling.

Sea-elephants are found on Kerguelen's Land, Juan Fernandez, South Georgia, the States islands, South Shetland, the Falkland islands, etc. They migrate southwards at the beginning of summer, and northwards at the approach of winter, thus avoiding the extremes of heat and cold. A single individual sometimes yields 1400 or 1500 pounds or 70 gallons of excellent oil, on account of which these animals are pursued to an extent that seems to have already much reduced the numbers of the species. They are either shot or killed by means of long lances. Cuttle-fish and other cephalopods seem to be their principal food; but remains of marine plants have also been found in the stomach.

The skin of the sea-elephant is not at all valued on account of its fur, but its thickness and strength make it very useful for harness-making and similar purposes. The flesh is black, oily, and indigestible; the tongue (salted) alone being esteemed a delicacy. The principal product, however, is the oil, which burns slowly, with a clear flame, and without smoke or disagreeable odor.

ELEPHANTA, an island of 6 m. in circuit, stands in the harbor of Bombay (q.v.), about 7 m. to the e. of that city, and about 5 m. to the w. of the mainland. It takes this its European name from a huge figure of an elephant near its principal landing-place, which, however, appears to have gradually crumbled away. This colossal animal has been cut out of a detached rock, which is apparently of basaltic origin. Further towards the interior, three temples, dug out of the living mountain, present themselves—the roofs being supported by curiously wrought pillars of various forms and magnitudes, and the walls being thickly sculptured into all the varieties of Hindu mythology. The largest of the three excavations is nearly square, measuring 133 ft. by 130½ ft.; and immediately fronting its main entrance stands a bust or third-length of a three-headed deity, with a height of 18 ft., and a breadth of 23. These monuments of superstition, like the quadruped which guards, as it were, the approaches to them, are said to be rapidly decaying—a state of things which, besides in some measure accounting for the execution of such works, seems to be inconsistent with any very high antiquity. The island is in lat. 18° 57′ n., and long. 73° east.

ELEPHANTI'ASIS is a term applied to two varieties of skin-disease, in which the limbs, from their enlargement, and from the changed condition of the skin, have a slight resemblance to those of the elephant. There is the *elephantiasis of the Greeks*, which is usually regarded as the same as the eastern leprosy, and as the *spedalskhed* of Norway; and the chief features of which are described in the article LEPROSY. In this affection, the size of the limbs and the state of the epidermis are comparatively slightly altered. In the *elephantiasis of the Arabs*, which seems to be identical with the *Barbadoes leg*, (q.v.), there is great enlargement of the affected parts, and the skin is much thickened.

ELEPHANTINÉ, a small island of the Nile, lying opposite to Assouan (q.v.), the ancient Syene, on the confines of Egypt and Nubia, in 24° 5′ n. lat., and 32° 34′ e. long. From this island, the Greek mercenaries were sent by Psammitichus I. to recall the

Egyptian deserters, and it was garrisoned in the time of the Pharaohs, Persians, and Romans. The island was anciently called *Abu*, or the "ivory island," from its having been the entrepot of the trade in that precious material. The most important ruins are a gateway of the time of Alexander, and a small temple dedicated to Khnum, the god of the waters, and his contemplar deities, Anucis and Sate. This temple was founded by Amenophis III., and embellished by Rameses III. Another remarkable edifice is the ancient Nilometer, formerly mentioned by Strabo, and which appears to have been built in the time of the Cæsars; and several remaining inscriptions record the heights of inundation from the time of Augustus to Severus. This island had the honor of giving a dynasty (the 5th) to Egypt, and was evidently an important place, the inscriptions on the rocks attesting the adoration paid by Sethos I., Psammitichus II., and other monarchs, to the local deities. Other interesting monuments have been found on this island: amongst which may be cited part of a calendar recording the rise of the dog-star in the reign of Thothmes III. (1445 B.C.), and numerous fragments of pottery—principally receipts in the Greek language—given by the farmers of the taxes in the reign of the Antonines. The island is at present inhabited by Nubians.—Wilkinson, *Topography of Thebes*, p. 460; Champollion, *Notice Descriptive*, p. 215; Champollion, *Lettres Ecrites*, pp. 111, 157, 171, 382.

ELEPHANT'S FOOT, or HOTTENTOT'S BREAD (*testudinaria elephantipes*), a plant of the natural order *dioscoreaceæ*, of which the root-stock forms a large fleshy mass, curiously truncate, or abruptly cut off at the end, so as somewhat to resemble an elephant's foot, and covered with a soft, corky, rough, and cracked bark. From this springs a climbing stem, which bears the leaves and flowers. The root-stock is used as food by the Hottentots. The plant is not unfrequently to be seen in hot-houses in Britain.

The name ELEPHANT'S FOOT (*elephantopus*) is also given, on account of the form of the root-leaves, to a genus of plants of the natural order *compositæ*, sub-order *corymbiferæ*, one species of which (*E. scaber*) is common in elevated dry situations in all parts of India, and is used in Indian medicine in affections of the urinary organs.

ELETTA'RIA. See CARDAMOMS.

ELETZ. See JELETZ.

ELEUSINE, a genus of grasses, chiefly natives of India and other warm climates, several of which are cultivated as grains. This is especially the case with *E. corocana*, an Indian species, called natchnee and nagla ragee, also mand and murwa, which has aggregated digitate spikes finally incurved. The Thibetans make a weak sort of beer, much in use amongst them, from this grain. *E. stricta* is cultivated as a grain-crop in the same parts of the world, and is, like the former, extremely productive. The grain called tocusso in Abyssinia is also a species of this genus, *E. tocusso*.—A decoction of *E. Ægyptiaca* is used in Egypt for cleansing ulcers; and a drink made from the seeds is regarded as useful in diseases of the kidneys and bladder. A decoction of *E. Indica* is also administered to infants in Demerara, to prevent or cure convulsions.

ELEUSIN'IAN MYS'TERIES, the sacred rites with which the annual festival of Ceres was celebrated at Eleusis. Many traditions were afloat in ancient times as to the origin of this festival. Of these, the most generally accepted was to the effect that Ceres, wandering over the earth in quest of her daughter Proserpine, arrived at Eleusis, where she took rest on the *sorrowful stone* beside the well Callichorus. In return for some small acts of kindness, and to commemorate her visit, she taught Triptolemus the use of corn on the Rharian plain near the city, and instituted the mystic rites peculiarly known as hers. The outward method of the celebration of these mysteries is known with considerable accuracy of detail. Their esoteric significance is very variously interpreted. The ancients themselves generally believed that the doctrines revealed to the initiated gave them better hopes than other men enjoyed, both as to the present life and as to a future state of existence. Modern speculation has run wild in the attempt satisfactorily to explain these mysteries. As reasonable a solution as any other seems to be that of bishop Thirlwall, who finds in them "the remains of a worship which preceded the rise of the Hellenic mythology and its attendant rites, grounded on a view of nature, less fanciful, more earnest, and better fitted to awaken both philosophical thought and religious feeling." The festival itself consisted of two parts, the greater and the lesser mysteries. The less important feast, serving as a sort of preparation for the greater, was held at Agræ, on the Ilissus. The celebration of the great mysteries began at Eleusis on the 15th day of Boëdromion, the third month of the Attic year, and lasted over nine days. On the first day (called *agurmos*, the assembling), the neophytes, already initiated at the preparatory festival, met, and were instructed in their sacred duties. On the second day (called Haladé, mystæ, *To the sea, ye initiated!*), they purified themselves by washing in the sea. On the third day, sacrifices, comprising, among other things, the mullet-fish, and cakes made of barley from the Rharian plain, were offered with special rites. The fourth day was devoted to the procession of the sacred basket of Ceres (the Kalathion). This basket, containing pomegranates, salt, poppy-seeds, etc., and followed by bands of women carrying smaller baskets similarly filled, was drawn in a consecrated cart through the streets, amid shouts of "Hail, Ceres!" from the onlookers. The fifth day was known as the "day

of the torches," and was thought to symbolize the wanderings of Ceres in quest of her daughter. On it the mystæ, led by the "daduchus," the *torch-bearer*, walked two by two to the temple of the goddess, and seem to have spent the night there. The sixth day, called Iacchus, in honor of the son of Ceres, was the great day of the feast. On that day the statue of Iacchus was borne in pomp along the sacred way from the Ceramicus at Athens to Eleusis, where the votaries spent the night, and were initiated in the last mysteries. Till this stage of the proceedings, they had been only *mystæ;* but on the night of the sixth day they were admitted into the innermost sanctuary of the temple, and, from being allowed to behold the sacred things, became entitled to be called "epoptæ," or "ephori;" i.e., *spectators*, or *contemplators*. They were once more purified, and repeated their original oath of secrecy with an imposing and awful ceremonial, somewhat resembling, it is believed, the forms of modern freemasonry. On the seventh day, the votaries returned to Athens with mirth and music, halting for a while on the bridge over the Cephisus, and exercising their wit and satire against the spectators. The eighth day was called Epidauria, and was believed to have been added to the original number of the days for the convenience of those who had been unable to attend the grand ceremonial of the sixth day. It was named in honor of Æsculapius, who arrived on one occasion from his native city of Epidaurus too late for the solemn rites, and the Athenians, unwilling to disappoint so distinguished a benefactor of mankind, added a supplementary day. On the ninth day took place the ceremony of the "Plemochoæ," in which two earthen vessels filled with wine were turned one towards the e., and the other towards the west. The attendant priests, uttering some mystic words, then upset both vessels, and the wine so spilt was offered as a libation.

Initiation into the Eleusinian mysteries was compulsory on every freeborn Athenian; but slaves, prostitutes, and persons who had forfeited their citizenship were excluded from the rites. During the period of the festival, none of those taking part in it could be seized or arrested for any offense. Lycurgus, with a view to destroying distinctions of class, forbade any woman to ride to the Eleusinia in a chariot, under a penalty of 6,000 drachmæ. The mysteries were celebrated with the most scrupulous secrecy. No initiated person might reveal what he had seen under pain of death, and no uninitiated person could take part in the ceremonies under the same penalty. The priests were chosen from the sacred family of the Eumolpidæ, whose ancestor, Eumolpus, had been the special favorite of Ceres. The chief priest was called the "Hierophant," or "Mystagogue;" next in rank to him was the Daduchus, or Torch-bearer; after them came the "Hiero-Ceryx," or sacred herald, and the priest at the altar. Besides these leading ministers, there was a multitude of inferior priests and servants.

ELEU'SIS, a celebrated t. in ancient Attica, stood near the northern shore of the gulf of Salamis, and not far from the confines of Megaris. It was famous as the chief seat of the worship of Ceres, whose mystic rites were here performed with great pomp and solemnity from the earliest authentic times till the era of Alaric. See ELEUSINIAN MYSTERIES. The temple of the goddess, designed by Ictinus, the architect of the Parthenon, was the largest sacred edifice in Greece. The site of the old Eleusis is now occupied by the little village of Lefsina or Lepsina.

ELEU'THERA, one of the Bahamas (q.v.), is, next to New Providence, the most populous island in the whole chain. Including its dependent *cayos* or *keys*, E. has a pop. of 5,209. It is more fertile than most of its neighbors, more especially surpassing all of them in the growth of fruit, such as the pine-apple, the orange, and the lemon.

ELEUTHE'RIA, a festival of the Greeks, to commemorate their deliverance from the invader Xerxes, instituted after the battle of Platæa, 479 B.C. There was a semi-military parade, eulogies on the heroes who fell in the great battle, the sacrifice of a bull to Jupiter and Mercury, and the sprinkling of the ground with wine.

ELEUTHE'RIA BARK, a name not unfrequently given to the bark of the *croton eleutheria*, also known as cascarilla bark. See CASCARILLA. It is called eleutheria (or eleuthera) bark, because it is chiefly gathered on the island of Eleuthera.

ELEVATED. Wings turned upwards are described in heraldry as elevated.

ELEVA'TION, in architectural drawing, is the representation of the flat side of a building, drawn with mathematical accuracy, but without the slightest attention to effect. In art, again, elevation is a raising of the subject beyond its ordinary character in real life. A very good instance of elevation in this sense is given by Fairholt in his *Dictionary of Terms in Art*, in Rembrandt's "Adoration of the Shepherds." The whole of the objects and surroundings of the infant Saviour are of the most homely description; and still the light which is represented as issuing from his person gives an elevation to the scene which takes off from it entirely the character of being commonplace or vulgar.

ELEVATION, in astronomy and geography, means generally the height above the horizon of an object on the sphere, measured by the arc of a vertical circle through it and the zenith. Thus, the elevation of the equator is the arc of a meridian intercepted between the equator and the horizon of the place. The elevation of the pole is the complement of that of the equator, and is always equal to the latitude of the place. The

elevation of a star, or any other point, is similarly its height above the horizon, and is a maximum when the star is on the meridian.

ELEVATION OF THE HOST (Host, *ante*). Members of the church of Rome worship the host under the assumption that the bread and wine in the Lord's supper are transubstantiated into the real body, blood, and divinity of Christ, who is, on each celebration of the sacrament, offered up anew as a victim (*hostia*) by the priests. The council of Trent, having determined that upon consecration the bread and wine of the sacrament are changed into the body of the Lord Jesus Christ, true God and true man, gave this decision: "There is, therefore, no room to doubt that all the faithful in Christ are bound to venerate this most holy sacrament, and to render thereto the worship of *latria*, which is due to the true God according to the constant usage of the Catholic church." In conformity with this decision, the rubric of the missal says: "Having uttered the words of consecration, the priest immediately, falling on his knees, adores the consecrated host; he rises, shows it to the people, places it on the corporale, and again adores it." Rising up after he has adored it, he elevates it before the people, who, as soon as they see it (having notice also by the ringing of the bell), fall down in humble adoration to it as if it were God himself. They pray to it, and use the same acts of invocation as they use to Christ. The host is also elevated for worship when it is carried through the streets in solemn procession, on its way to the dwellings of the sick, or on the feast of Corpus Christi, or before the pope. The custom of thus elevating the host was introduced into the church of Rome in 1216, the year after transubstantiation was made an article of faith. Pope Honorius then ordered that the priests, at a certain point of the mass service, should lift up the host and cause the people to prostrate themselves in worshiping it.

ELEVENTH, in music, is the interval of the octave above the fourth.

ELF, a fairy, pl. Elves. See Fairies.

ELF-ARROW-HEADS, Elfin-arrows, Elf-bolts, Elf-darts, Elf-shot, and Elf-stones, names popularly given in the British islands to the arrow-heads of flint which were in use at an early period among the barbarous tribes of this country and of Europe generally, as they are still in use among the American Indians, the Esquimaux of the Arctic regions, and the inhabitants of some of the islands in the Pacific ocean. It was believed that elves or fairies, hovering in the air, shot these barbs of flint at cattle, and occasionally even at men. Thus, Robert Gordon, of Straloch, an accomplished country gentleman of the n. of Scotland, writing in 1654, tells how one of his friends, traveling on horseback, found an elf-arrow-head in the top of his boot, and how a gentlewoman of his acquaintance, when out riding, discovered one in the breast of her habit. He remarks that, although they are got by chance in the fields and on the highways, one who goes to look for them on purpose will search in vain. He adds that they are most commonly met with after showers—a circumstance which probably helped them in Germany to their names of "thunder-bolts" and "thunder-stones," and is easily enough explained. The rain, by washing away the earth in which they have been imbedded, makes them more readily perceptible to the eye, especially if the sunshine happens to fall upon them. Cattle dying suddenly in the fields were believed to have been struck by elf-arrows—a belief which yet lingers in Ireland, and perhaps in some secluded parts of Scotland. "Thus, when cattle are sick," writes Mr. W. R. Wilde, in his *Catalogue of the Antiquities in the Museum of the Royal Irish Academy* (Dub. 1857), "and the cattle doctor, or fairy doctor, is sent for, he says the beast has been 'elf-shot,' or stricken by fairy or elfin darts; and he forthwith proceeds to feel the animal all over; and, by some legerdemain, contrives to find in its skin one or more poisonous weapons, which, with some coins, are then placed in the water which is given it to drink; and so a cure is said to be effected." The elf-arrow-head was occasionally set in silver, so as to be worn on the person as a talisman, or had a hole drilled through it, so that it might be dipped in water, which, being thus endowed with healing virtue, was used sometimes as a wash, more commonly as a draught. As a talisman, the elf-arrow-head was believed to be most efficacious as a preservative from poison and witchcraft. The ascription of the flint arrow-head to the elves or fairies, is but one of several instances of the disposition of a people to elevate or degrade the earlier races whom they vanquished or dispossessed into mythical beings, better or worse than mankind. Thus, in Greece and Italy, the remains of the rude strongholds built by the Pelasgi came to be regarded as works of the fabled Cyclops, or one-eyed giants. So also, in Scotland, the sepulchral mounds of the aboriginal inhabitants were called "elf-hillocks;" and the vestiges of ancient plowshares which may be traced on heaths and hill-tops were called "elfin-furrows." Examples of "elf-arrow-heads" may be seen in most museums of antiquities. They fall to be more particularly described in a following page, under the head of Flint Implements and Weapons.

EL-GHOR, "*the valley,*" is, according to Robinson (*Phys. Geog.*, p. 73), the name now given to the northern part of the great depression which extends from the base of Mt. Hermon to the Red sea. The southern part retains the old Hebrew name, El-Arabah (q.v.), the boundary between the two being the range of chalk cliffs about 6 m. s. of the Dead sea. The length of El-Ghor, from the sea of Galilee to the Dead sea, is about 65

m., and between these points there is an average descent of over 10 ft. to a mile. The width of the valley varies from about 6 m. at the northern end to 10 or 12 in the neighborhood of Jericho. On the w. is a series of irregular and precipitous cliffs from 800 to 1200 ft. high, everywhere naked and desolate; on the e. the mountains are still higher. About 22 m. s. of the sea of Galilee the ridge Kum Surtabeh, crossing the valley obliquely, divides it into the upper and lower Ghor. At this point there is a sudden "break-down" in the bed of the Jordan. Above it the valley is generally well-watered and fertile; below, it becomes dry and desolate, being covered with a white nitrous crust. Within the general valley of El-Ghor there is a still lower depression, varying from a quarter to a half of a mile in width, through which the Jordan flows (q.v.).

ELGIN, a co. in the province of Ontario, Canada, on lake Erie and Thames river; intersected by the London and Port Stanley railroad; 725 sq.m.; pop. '71, 33,666. The co. town is St. Thomas.

ELGIN, a city in Kane co., Ill., on Fox river, at the junction of the Chicago and Pacific, and the Freeport and Dubuque branch of the Chicago and Northwestern railroads; 35 m. w. of Chicago; pop. '70 (of township), 5,441. The city is on both sides of the river, which affords abundance of water-power. The Elgin National Watch company is the most important of several manufacturing establishments, and its watches, made by machinery, are highly esteemed, and have an extensive sale. Elgin is the center of a fine agricultural region, and has a good trade.

ELGIN, a royal burgh, the co. t. of Elgin or Morayshire, and a station on the Inverness and Aberdeen Junction railway, situated on the right bank of the river Lossie, about 5 m. from the sea. Pop. '71, 7,339. E. joins with Banff, Peterhead, Inverury, Cullen, and Kintore, in returning a member to parliament. It was probably a royal burgh so early as the reign of king David I. (1124–53), and had its privileges confirmed by several of his successors. Its trade is now almost wholly retail. E. has 12 yearly fairs, and a weekly grain market. It has a parish church, which is collegiate, 2 free churches, 2 United Presbyterian churches, 1 Baptist church, 1 Original Secession, 1 Independent, 1 Episcopal, and 1 Roman Catholic; with 10 schools. Gray's hospital for the sick poor, built and endowed from a bequest of £20,000 by the late Dr. Alexander Gray, of Bengal, and opened in 1819, with a lunatic asylum attached, now the Elgin district asylum; and the Elgin or Anderson's institution for the support of old age and the education of youth, built and opened 1831–33, on the foundation of £70,000 bequeathed by the late maj.gen. Anderson, H.E I.C.S.—are the principal of many public and private charities. E. is chiefly remarkable for the beauty of its situation, lying placidly in a gentle curve of the Lossie, for the salubrity if its climate, and for its history as the see of the bishop of Moray. Its appearance, about 60 years ago, was that of a little cathedral city, with an antique fashion of building, and with "a certain solemn drowsy air about the town and its inhabitants." That appearance is fast giving way to that of a gay modern county town, surrounded by elegant villas. The old town was partially burned in 1390 by the notorious Wolf of Badenoch (Alexander Stewart, earl of Buchan); in 1402, by Alexander, the son of the lord of the Isles; and in 1452, by the earl of Huntly—this last calamity originating the proverb, "Half done, as Elgin was burned." Its once magnificent cathedral church, partly of early English and partly of middle-pointed architecture, dedicated to the Holy Trinity, was begun by bishop Andrew Moray in 1224, on the transference of the see from Spynie; was injured by fire in 1270; was nearly burned down by the Wolf of Badenoch in 1390; was restored under bishops Bur, Spyny, Innes, and Leighton (1390–1424); and from subsequent accident and dilapidation is now a mere ruin. The other religious buildings of the olden time were the church of St. Giles, a picturesque example of our old parish churches, replaced 1826–28 by the modern less interesting structure; the monastery of the Black Friars, long since demolished; the convent of the Gray Friars, the walls of whose church remain; the hospital of the Maison Dieu, on the site of which is Anderson's institution; the Leper house, still commemorated by the grounds called the Leper lands; and the chapel of St. Mary of the castle, which gave name to the Lady hill and Lady well on the w. of the town. The castle itself, styled of old the manor of Elgin, whose ruins, surmounted by an obelisk—erected to the memory of George, fifth and last duke of Gordon—crowned the Lady hill, was a residence of the earls of Moray, for some time superiors of the burgh under our Scottish kings.

ELGIN, THOMAS BRUCE, Earl of, 1766–1841; the seventh of the line, succeeding his brother in the earldoms of Elgin and Kincardine when but seven years old. He rose to be gen. in the British army; was envoy at Brussels, at Berlin, and at Constantinople. While at the latter place he secured and removed from Athens the sculptures known as the "Elgin marbles," now in the British museum. (See ELGIN MARBLES, *ante.*) Lord Elgin was a representative peer of Scotland for more than 50 years.

ELGIN AND KINCARDINE, Earl of, Governor-General of India. James Bruce, eighth earl of E., was b. in Park Lane, London, in 1811. He was educated at his father's seat, in Fifeshire, and afterwards went to Christ church, Oxford, where he was first-class in classics, 1832; became fellow of Merton, and graduated M.A., 1835. He

entered public life in 1841, when, as lord Bruce, he was returned at the general election on the conservative interest for Southampton. A petition was presented against the return, and the election was declared void. Before, however, a new writ could issue, lord Bruce had succeeded his father (who enriched the British museum by the invaluable collection of sculpture known as the "Elgin marbles," q.v.) as earl of Elgin. Those who remember his early parliamentary and pre-colonial career, state that he gave early promise of oratorical distinction, and assert that if he had thrown himself into the politics of the day, he would have taken a high position as a parliamentary debater. By succeeding to a Scotch peerage, however, he was, in his own words, "expelled from the house of commons without being admitted into the house of peers." Being offered the governorship of Jamaica, in Mar., 1842, by the earl of Derby—then lord Stanley—he went to Jamaica, where he administered the affairs of the island with so much ability and success, that in Aug., 1846, the governor-generalship of Canada was tendered to him by earl Grey, then secretary of state for the colonies in the administration of lord J. Russell. Lord E., still finding himself in the same position as a Scottish peer, accepted the office, and went to Canada. His administration of the government of Canada will ever be a bright spot in our colonial history, and a model to future governors of English dependencies. He found Canada governed by cliques, and torn by intestine feuds. With admirable tact and entire success, he inaugurated a system of self-government, which has rendered the provinces of British America a support to the British throne, in place of being a source of weakness. Under his government, Canada made such strides in importance and prosperity, that between 1847 (in the beginning of which year he entered upon his government) and 1855, when he returned to England, the revenue of that great British possession quadrupled itself. During his administration, he successfully negotiated a treaty for reciprocity of trade between British America and the United States, which admitted the whole produce of British North America to be brought into competition with the products of the United States in their own markets. This treaty, till it was renounced by the United States in 1866, put an end to the risk of collision as to the fisheries between this country and America, which lord E. described as the most serious risk which had presented itself during his public service. His popularity was great, not only in Canada but the adjacent states, the citizens of which offered him ovations. He was now a peer of the United Kingdom (having been summoned to the house of lords in 1849), and was appointed lord-lieutenant of Fifeshire. In 1857, the affair of the lorcha *Arrow*, and the bombardment of Canton, by sir John Bowring, led lord Palmerston to invite lord E. to go to China as plenipotentiary extraordinary. An army was equipped to carry out the policy prescribed by the British government, and he started on his mission. But before he could approach his destination, and when he had barely left England a month, the Indian mutiny broke out. Lord E. did not hesitate a moment in preferring the safety of India to the success of his Chinese negotiations. He dispatched the Chinese expedition to lord Canning's assistance, and the English in India were thus enabled to hold their ground until further reinforcements arrived. After thus consigning himself to an inaction of several months, lord E. proceeded to China, and in 1858, in conjunction with baron Gros, the French plenipotentiary, he negotiated the treaty of Tientsin, which promised to give Great Britain a freer access to China than she had ever enjoyed before. He found time, before his return, to negotiate a treaty with Japan, under which English manufactures are admitted at low rates of duty, and a British minister is permitted to reside at Jeddo. On his return home, he was appointed postmaster-general. He had scarcely time to become acquainted with his duties, before the treachery of the Chinese, in firing upon the British squadron from the Taku forts, led to the organization of another Chinese expedition, and to lord E.'s second mission to China. A combined English and French force penetrated to the capital, and enabled lord E. and baron Gros to dictate a peace under the walls of Pekin. On the expiration of viscount Canning's term of service, the governor-generalship of India was offered by lord Palmerston to lord E. (1861), and accepted by him. He died in India, Nov., 1863. Lord E. (who was the representative in the male line of the great Scottish house of Bruce) was twice married: in 1841, to the daughter of Mr. Cumming Bruce, M.P. (she died 1843); and in 1846, to the daughter of the first earl of Durham, by whom he had a son, Victor Alexander, present earl, born 1849, and other issue. Lord E. was K.T. (1847), privy councilor (1857), G.C.B., civil, extra (1858).

ELGIN MARBLES, a celebrated collection of ancient sculptures, brought from Greece by Thomas, seventh earl of Elgin, and acquired from him by the nation for the British museum in 1816, at the sum of £35,000.

These sculptures adorned certain buildings on the Acropolis of Athens; the chief portions, which are from the Parthenon or temple of Minerva, were designed by Phidias, and executed by him, or under his superintendence. They consist of—1. Portions of several of the statues that were placed in the e. and w. tympana or pediments, the most important of which are the Theseus or Hercules, Ilissus or river-god, upper portions of the torsos of Neptune and Minerva, Iris, torso of Cecrops, Ceres, and Proserpine, the Fates, heads of the horses of Hyperion, and one of the horses of Night. Of all these, the Theseus, and the head of the horse of Night, are the most perfect, the former wanting only the hands and feet and part of the nose, while even the surface of the latter is

very little injured. But however mutilated, the greatness in style of these magnificent works is clearly manifest, and from the merest fragment valuable instruction in art may be obtained. 2. Fifteen metopes, executed in high relief, representing the battle of the Centaurs and Lapithæ. A metope is the interval betweent he triglyphs on a Doric frieze—in the Parthenon there were 92, 14 on each front, and 32 on each flank of the temple—and on every metope, a Centaur engaged in conflict with one of the Lapithæ is represented in a style of the highest excellence in point of spirit and truthfulness. 3. A large portion of the frieze of the outer walls of the cella. This remarkable work represents the solemn procession to the temple of Minerva during the Panathenic festival, and has never been equaled for elegance of composition and the variety and gracefulness of the figures. It is executed in low relief, in order to adapt it to the light, for placed within the colonnade, it received its light between the columns, and by reflection, from the pavement below. This exquisite frieze occupied, slab after slab, a space of 524 ft. in length. The remains of it in the British museum on slabs and fragments of marble are to the extent of upwards of 249 ft., besides 76 ft. in plaster casts.

Although the Elgin marbles are now acknowledged to be the most precious collection existing of specimens of Greek art in its purest state, yet it was only after very considerable hesitation that government consented to purchase them, and then the sum awarded was not only far short of anything like a fair value, if indeed a value could be put on such treasures, but lord Elgin was left largely out of pocket after all his exertions. Again, from petty jealousy, some of the connoisseurs of the day, who had earned a sort of reputation from their collections—of whom Mr. Payne Knight may stand for the type—made strong efforts to underrate these great works; while others, like lord Byron, from feelings apparently generous, but quite mistaken, because not based on fact, heaped obloquy on lord Elgin, and opposed their acquisition. But it has been clearly proved that lord Elgin, so far from destroying, has saved these masterpieces from destruction. It was not to be expected but that foreigners would grudge this country such an acquisition, but certainly it is remarkable that such opinions should have been expressed in this country. The view adopted by a foreigner, who has devoted much attention to the subject, M. Viardot, author of *Les Musées d'Europe*, may be accepted as that generally taken abroad; and it is very different from that at one time so pertinaciously maintained by many in this country. M. Viardot remarks: "It is said that, to justify the appropriation of the Lahore diamond, the English allege that if they have taken it, it was merely to prevent its appropriation by others. They may give the same excuse for their appropriation of the marbles of the Parthenon. No doubt, lord Elgin has carried them off; and the Greeks of the present day, seeing the old temple of their Acropolis despoiled of all its ornaments, have a good right to curse the spoiler. But when we think of the devastation these works have so often experienced, the total destruction of the principal statues, and the shameful mutilation of the others, and the risk these last ran of being entirely destroyed in their turn—when we consider that these precious relics of art are conserved in a place of surety, and placed in the center of artistic Europe, one loses the desire and almost the right to charge the English with piracy and robbery. For my part, if, in the course of my long devotion to the marbles of Phidias, a regret has come to trouble the ardent pleasure of my admiration, it was, that the robber of these marbles was not a Frenchman, and their resting-place the museum of Paris.' —*Visconti on the Sculptures in the Collection of the Earl of Elgin* (John Murray, London, 1816), *Library of Entertaining Knowledge—British Museum*, (London, Charles Knight).

ELGINSHIRE, MO'RAYSHIRE, or MURRAYSHIRE, a maritime co. in the n.e. of Scotland, on the Moray firth. It contains 531 sq.m., and is 30 m. long and 20 m. broad. About a third part was formerly cut off on the s. by a detached part of Inverness-shire; but by an act of parliament, passed in 1870, this part was annexed to Inverness-shire, and a part of the intervening portion of Inverness-shire, of about the same extent, rental, and population, was annexed to Elginshire. In the s. are the high and rugged Monadhliadh mountains of Inverness-shire, dividing the basins of the Spey and Findhorn, and forking in the n. to include the basin of the Lossie. In the s., gneiss predominates, with a little granite; and in the n., sandstone with fish and reptilian remains, and small patches of oolitic and Wealden strata. West of the Findhorn mouth are the sand-dunes of Culbin, 3 sq.m. in extent, some of them rising 118 feet. Great masses of peat and trunks of trees are often cast ashore near the mouth of the Findhorn. The climate is mild and dry, and the co. has been called the Devonshire of Scotland, the mountains of Aberdeenshire and Banffshire protecting it from the cold moist winds of the German ocean. The soil is open, sandy, and gravelly, and very fertile in the n., with some deep loams and clays. In 1878, nearly a third of the co.—104,274 acres—was under crop, the chief crops being oats, barley, and turnips. Pop. '71, 43,612, chiefly agriculturists. The chief exports are grain, cattle, salmon, and timber. There are some manufactures of woolens and malt liquors. E. unites with Nairnshire in sending one member to parliament. It contains 14 entire parishes, and 8 parts of parishes. In 1871, 84.87 per cent of children, from 5 to 13 years, were receiving education. The total valuation of E., including the burghs of Elgin and Forres, was, for 1877-78, £223,279; this includes railways. The ancient province of Moray

included the counties of Elgin and Nairn, and parts of those of Inverness and Banff. Scandinavians early settled in it. About 1160, Malcolm IV. subdued it. The chief antiquities are Elgin cathedral, Spynie castle, Duffus castle, Pluscarden abbey, Kinloss abbey, and the Norman parish church of Birnie. Burghead, on the coast, is supposed by many to have been a Roman station, but its ramparts and ditches, now almost destroyed, were probably of more recent origin. It was the last stronghold of the Norsemen in this part of Scotland. E. was overrun in the civil wars of Montrose, 1645, etc.

ELI, the high-priest of Israel in the latter part of the period during which the ark of the covenant remained at Shiloh. That he was of the family of Ithamar, the youngest son of Aaron, is shown by comparing several passages of Scripture. He was probably the first high-priest in that branch of Aaron's family. His sons having died before him, the office passed to his grandson, Ahitub, and continued in his family until Solomon removed Abiathar and made Zadoc, a descendant of Eleazar, high-priest. Eli was also judge over Israel for a period of 40 years, beginning, probably, soon after the death of Samson, and extending to his own death. If his languid reproofs of the wickedness of his sons were fair specimens of his general administration, he must have been a very inefficient magistrate. The divine judgment came at length on his house for the iniquity which he knew was practiced but did not strive to arrest. His sons made themselves vile, and he restrained them not. The sentence against them, pronounced first by a prophet and afterwards by the child Samuel, was executed in a battle with the Philistines, during which the ark of God was taken and the dissolute priests were slain. When Eli, then 98 years old, heard the news, he fell backward from his seat and died.

ELIA. See LAMB, CHARLES, *ante*.

ELI'AS, ST., a lofty mountain which occupies a conspicuous position on the n.w. coast of America, in lat. 60° 18′ n., and in long. 140° 30′ west. It rises about 17,860 ft., or almost 3½ m. above the sea, being visible to mariners at a distance of 50 leagues. Physically, it marks pretty nearly the point where the shore, after trending in a n.w. direction, turns due w., and politically it divides itself between the United States territory of Alaska and the Dominion of Canada.

ELIAS LEVITA, 1472–1549; b. Bavaria; the most distinguished Hebraist of his time. Banished because he was a Jew, he went to Italy early in the 16th c., taught Hebrew at Venice and Padua, and lectured and wrote on Hebrew grammar. In 1512, he went to Rome, where he was so friendly with high dignitaries of the church, that he was accused of apostasy. His latest years were spent in Venice. He was the author of many works, of which the most valuable are those in Hebrew philology.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE; 1798–1874; b. France; professor of geology in the Paris school of mines; in 1833, engineer in chief of the mines of France; senator of France in 1852, and on the death of Arago chosen perpetual secretary of the academy of sciences. His best service to science was in connection with the geological map of France, on which he was employed for 18 years.

ELI'JAH (in the Greek form, occurring in the New Testament, Elias), the greatest of the prophets of Israel, was born at Tishbe, in Gilead, on the borders of the desert. He comes upon the scene in the time of Ahab, about 920 B.C. When that monarch, to please his Phœnician wife Jezebel, had introduced, on an extensive scale, the worship of Baal, E. pronounced a curse on the *land*. The prophet had to flee. He took refuge by the brook Cherith, probably one of the torrents that cleave the high table-land of his native region. Here he was miraculously fed by ravens. He then went to Zarephath, a town lying between Tyre and Sidon. Here he lodged with a widow woman, prolonged her oil and meal, and brought back her son to health from the brink of the grave. Subsequently, he made a temporary reconciliation with Ahab, and on Mt. Carmel executed dreadful vengeance on the prophets of Baal, slaying 400 with his own hand. Such a deed enraged Jezebel to the utmost. She swore to destroy the prophet, who once more took refuge in flight. He rested not till he reached Beersheba in the far south, on the edge of the desert that leads down to Sinai. The brief allusion in Scripture to his weary wanderings is very touching. At last he comes to Horeb, where he has an interview with Jehovah. The passage in which this is recorded is one of the grandest and most significant in the whole of the Old Testament. He then receives certain instructions from Jehovah, among others that he should select Elisha to be prophet in his room. E.'s next appearance is when Ahab rides forth to take possession of Naboth's vineyard: he denounces the murderous monarch, and utters an awful prophetic curse on him and his wife. After the death of Ahab, he rebukes the idolatries of his son Ahaziah in a solemn and bloody fashion; and after the death of Ahaziah, we find him interfering in the affairs of the king of Judah, who had married a daughter of Ahab, and had begun to "walk in the ways of the kings of Israel." He denounced his evil doings, and predicted his death. The closing scene of his life on earth is exquisitely narrated. A chariot of fire and horses of fire appeared after Elisha and he had crossed the Jordan, and "Elijah went up by a whirlwind into heaven."

ELIMINA'TION is a process by which, where we have a number of statements concerning several quantities, we can obtain a separate statement concerning each. Thus, in algebra, elimination is the operation which consists in getting rid of a quantity or letter which is common, say, to two equations, by forming out of the two a new equation, in such a way as to make the quantity in question disappear. If three unknown quantities, for instance, are to be found from three independent equations, the first step is to form out of the three given equations two new equations, so as to eliminate one of the unknown quantities; from these two equations another of the quantities is eliminated in the same way, giving one equation with one unknown quantity, the value of which is then found. In complicated equations, elimination becomes difficult, and often impossible. Elimination is an important process in other sorts of reasoning besides the mathematical; in this larger acceptation, it means the setting aside of all extraneous considerations—of everything not essential to the result. In astronomical observations, the elimination of errors of observation is often effected by repeating the observations several times in such a way as to cause the errors to be of opposites kinds, then adding the observed values, and taking their average.—The word to "eliminate" is often erroneously used in the sense of, to "elicit," or bring to light.

ELIOT, CHARLES WILLIAM, LL.D., b. Boston, 1834; a graduate of Harvard, and tutor of mathematics in that institution. In 1858, he became interested in chemistry, and went to Europe to study that branch of science. In 1865, he was appointed professor of chemistry and metallurgy in the Massachusetts institute of technology; in 1869, he succeeded Thomas Hill as president of Harvard university. His father, SAMUEL ATKINS ELIOT, was the author of a history of Harvard, and for nearly a dozen years treasurer of the college. Dr. E. has led in the introduction of extensive changes in the course of study and the administration of his college, tending towards the style of the European universities.

ELIOT, GEORGE. See EVANS, MARIAN.

ELIOT, JARED, 1685-1763; b. Conn.; grandson of the "apostle to the Indians," preacher, agriculturist, and botanist; also eminent as a physician. He brought the white mulberry-tree to Connecticut. Among his works were *Agricultural Essays*, and *Religion Supported by Reason and Revelation*.

ELIOT, Sir JOHN, 1592-1632; an English statesman, b. at his father's seat on the river Tamar. He graduated at Oxford, studied law, and traveled on the continent, for part of the time with George Villiers, afterwards duke of Buckingham. At the age of 22, he entered parliament, and at 27, was made vice-admiral of Devon, in which office he captured the famous Nutt, a pirate whose depredations were a constant infliction upon the commerce on the southern coast. But by corrupt influences at court, Nutt was released to continue his depredations, while E. was imprisoned, on false charges, in the Marshalsea for about four months. Immediately upon his release, in 1624, he was returned to parliament, where, during the first three parliaments of Charles I., with Pym, Hampden, Selden, and Coke, E. was the foremost leader in resistance to the encroachments of the crown, surpassing all the great statesmen of his time in his symmetrical union of learning, genius, and lofty devotion, with absolute personal bravery and the fire of oratory. He spoke out boldly against the lawlessness and venality of the ministry, and the weak, ill-tempered foreign policy of Buckingham, and urged parliament to withhold supplies until an account was given of the money already voted. For comparing Buckingham to Sejanus, he was imprisoned in the Tower in 1626; but the commons compelled his release, and exonerated him by special vote. He suffered another short imprisonment for petitioning the king against forced loans, and later received sentence of outlawry. These persecutions only increased his popularity, and though earnestly opposed by the court, he was again returned to parliament in 1628. He took part in drawing up the petition of right, and, on the last day of that parliament, read a protest against tonnage and poundage and other taxes unauthorized by parliament; and against the king's illegal encouragement of Arminians and Roman Catholics. Being summoned before the council, with Holles, Selden, Valentine, and others, he refused to answer for his acts in parliament except to parliament itself. He was then rigorously confined in the Tower, with his fellow-members, for more than two months, until manifestations of popular indignation compelled the king to bring him to trial. During tedious delays his confinement was somewhat softened; he occupied himself in writing a personal defense, and other works; and in Feb., 1631, sentence was at last given. All the prisoners were condemned to a fine, the largest, of £2,000, being imposed upon E.; to imprisonment during the king's pleasure; and not to be released until they had given security for good behavior, submitted to the king, and acknowledged their offenses. The confinement of the others was gradually relaxed, until they were all released, but E. would make no submission. Dec. 21, 1631, more than a year after his arrest, the council resolved to force him to submission. They removed him to a cold, unwholesome room, and forbade any one except his sons to visit him. His health broke down, and with medical advice he petitioned the king, in simple, manly words, for such release as health demanded. His petition was refused as not sufficiently humble. In a second petition he declared himself "heartily sorry that he had displeased his majesty," but added no words acknowledging wrong. He was denied an answer. He

had now been prisoner two years, and though only forty years old, was worn out with cruel confinement. He died two weeks after the king refused his last petition. Charles even refused permission to his sons to bury him in the family tomb, and ordered that he should be buried in the church of the parish where he died. During the commonwealth his sentence of conviction was reversed by act of parliament.

ELIOT, JOHN, 1604–90; "the apostle of the Indians;" b. at Nasing, Essex, Eng. He graduated at Cambridge in 1623, and entering the non-conformist ministry, emigrated in 1631 to Boston, Mass., where he officiated for a year in the church of Mr. Wilson, who was then in England, and, in 1632, he was settled over the church in Roxbury. He soon began preaching to the Indians, acquiring their language by the help of a young Pequot, taken prisoner in 1637. He translated the commandments, the Lord's prayer, and many texts, and first preached without an interpreter in 1646, at Nonantum, now Brighton, on the border of Newton. A settlement of Christian Indians was established, and a missionary society was organized in England, of which Robert Boyle was a leading member. This society sent Eliot £50 per annum to supplement his salary of £60 at Roxbury. In 1651, the settlement was removed to Natick, where an Indian church was formed in 1660. In 1653, E. published a catechism for their use, said to have been the first work published in the Indian language: no copy is known to exist. In the same year accounts of Eliot's labors were published by the corporation in London, and in 1655, a tract containing the doctrinal and experimental confession of these Indians who had been baptized and admitted to church fellowship. In 1660, E. published in London *The Christian Commonwealth, or the Civil Policy of the rising Kingdom of Jesus Christ*, which was criticised as containing seditious principles. The governor and council of Massachusetts required him to retract some of its utterances. About this time he completed his great work, the translation of the Bible into the Indian tongue. The New Testament was published at Cambridge, Mass., in 1661, the Old in 1663. A second edition of the New Testament was printed in 1680, and of the Old in 1685. Both of these editions are now very rare; the language in which it was written has ceased to be spoken, and only one or two persons in recent times are able to read it. E. was assisted in the translation by the Rev. John Cotton, of Plymouth, Mass. A new edition was printed at Boston, 1822. E. published many other works in the Indian and in the English tongue. His well-known *Indian Grammar Begun*, printed at Cambridge, Mass., 1666 (reprinted 1822), has at the end these memorable words: "Prayers and pains, through faith in Jesus Christ, will do anything." Of his *Indian Primer* (1669), the only complete copy known to exist is preserved in the library of the university of Edinburgh. It was reprinted, 1877. In 1671, E. printed in English, at Cambridge, *Indian Dialogues, etc.;* and in 1672, *The Logick Primer*. Of the former the only known copy is in a private library in New York; of the latter work there is a copy in the British museum, and another in the Bodleian library. Even in his old age the pen of E. was not idle. He died at Roxbury, Mass., at the age of 86, having won all hearts by his simplicity of life and manners, and his evangelical sweetness of temper, whether in the villages of the English colonists, or in the huts and wigwams of the Indians. His Indian publications are still of value for the light which they throw upon the structure and character of unwritten dialects.

ELIOT, SAMUEL, LL.D., b. Boston, 1821; graduated at Harvard, and traveled in Europe four years. He became professor of history and political science in Trinity college, Hartford, in 1856, and was president from 1860 to 1866; and in 1874, professor of political science and constitutional law in the same institution. He has published *Passages from the History of Liberty*, 1847, in which he traced the careers of Savonarola and other reformers, a work afterwards enlarged under the title *The Liberty of Rome*, 1849, and republished, with additional volumes, as *The History of Liberty*, 1853. He also published a *Manual of United States History*, 1856.

ELIOTT, or ELLIOT, GEORGE AUGUSTUS. See HEATHFIELD, LORD.

ELIS, one of the ancient divisions of the Peloponnesus, bounded n. and n.e. by Achaia, e. and s. by Arcadia, and w. by the Ionian sea. It was originally divided into three districts—Cœle or Hollow Elis, Pisatis, and Triphylia. Of these, the first-named was by far the largest and most valuable, comprising as it did the broad and fertile plains watered by the Peneus and the Ladon, and producing excellent crops of corn, cotton, and flax; while the pastures by the river-banks reared cattle and horses of proverbial excellence. This district, from its fertility, was called "the milk-cow of the Morea." Pisatis is drained by the Alpheus, and is separated from Cœle Elis by Mt. Pholoë, a spur of Erymanthus. The low grounds of this division possess great natural fertility. Most of the surface of Triphylia is hilly, being occupied with offshoots from the great Arcadian ranges. It is separated from Pisatis by the Alpheus, on whose banks were the grove and temple of Olympic Jove, and the plain in which the great Olympic games were celebrated. Though E. had few facilities for preventing invasion, it yet suffered less from war than any other of the Greek states—an advantage chiefly due to the sacred character of the country, as the seat of the greatest of the national festivals. Their prerogative of holding the Olympic games gave the Eleans a prestige which they continued to enjoy in greater or less degree till the games themselves were suppressed by the emperor Theodosius in 394 A.D.—ELIS, now *Kaloscopi*, the capital of the fore-

going country, stood on the Peneus, and was long famous as one of the most splendid and populous cities of Greece. It was at one time strongly fortified, and contained many magnificent buildings, conspicuous among which was the gymnasium, in which it was necessary that all athletes intending to take part in the Olympic games should go through a month's training before they were allowed to compete. See Leake's *Morea*, and Curtius' *Peloponnesus*.

ELI'SHA, a prophet of Israel, the successor of Elijah, who found him at the plow, and consecrated him to the sacred office by throwing his mantle over his shoulders. He exercised his functions for a period of 55 years. When Elijah was carried up into heaven, E. returned to Jericho, where he dwelt for some time. He then proceeded to Bethel, where the perplexing miracle occurred of the destruction of the 42 children by the two she-bears. After this period, he seems, besides performing an extraordinary number of miracles, to have taken an active part in the religious politics of his country, but he exhibited nothing of the fiery and sanguinary zeal of his master. Mild, tolerant, conciliatory, we hardly ever, if at all, find him rebuking the Baal-worship that was still prevalent in Israel. Many of the incidents in his history recall the creations of eastern fancy, such, for example, as those of the horses and chariots of fire round about E. on the hillside, of the smiting of the Syrian host with blindness, so that the prophet led them all unconsciously into Samaria, captive, etc. With Elijah, it has been said (see Smith's *Dictionary of the Bible:* art. "Elisha"), the miracles are "introduced as means towards great ends, and are kept in the most complete subordination thereto. But with E., as he is pictured in the Hebrew narrative, the case is completely reversed; with him, the miracles are everything, the prophet's work nothing. The man who was for years the intimate companion of Elijah, on whom Elijah's mantle descended, and who was gifted with a double portion of his spirit, appears in the Old Testament chiefly as a worker of prodigies, a predicter of future events, a revealer of secrets, and things happening out of sight or at a distance." The difficulties that thus beset the literal acceptance of the narrative of E.'s miracles have been felt by most modern commentators, and to evade these difficulties various methods, more or less satisfactory, have been employed. For several years E. was the chief theocratical counselor of Jehoram. Under the reign of Jehu and his successors, he gradually withdrew from public affairs, and died in Samaria in the reign of Jehoash, grandson of Jehu (about 840 B.C.). It has been customary to draw a parallel between E. and Christ; and his mildness and gentleness—always excepting the story of the destruction of the children at Bethel, which has perplexed all humane readers of Scripture—seem to justify this. E. is canonized in the Greek church; his day is the 14th of June.

ELIX'IR (Lat. *elixare*, to extract by boiling), a term in pharmacy, which has come down from the days of alchemy, and is applied to various preparations, consisting mostly of solutions of aromatic and bitter vegetable substances in spirits of wine. The term tincture is now more common. ELIXIR OF VITRIOL, or aromatic sulphuric acid, is prepared from 1½ fluid ozs. of sulphuric acid (oil of vitriol), 10 fluid ozs. of rectified spirit, ½ oz. cinnamon in powder, 1 oz. ginger in powder. The acid is gradually added to the spirit, and the mixture being placed in a closed vessel, is allowed to digest at a gentle heat for three days; the cinnamon and ginger are then added, and after being allowed to stand about six days, the whole is strained through cloth. The elixir of vitriol is useful for quenching thirst, sharpening the appetite, checking profuse perspiration, and often reducing the action of the pulse. The dose may range from 10 to 40 minims, and is administered in a wine-glassful of water, or some mild liquid, as infusion or conserve of roses.—ELIXIR VITÆ OF MATHIOLUS is composed of alcohol, and upwards of twenty aromatic and stimulating substances, and was at one time administered to patients suffering from epilepsy.

ELIZABETGRAD, a t. of South Russia, is situated in the midst of a delightful plain, on the banks of the Ingul, in lat. 48° 27′ n., long. 32° 15′ e., about 130 m. n. from Kherson. It consists of a town proper and four suburbs, is well built, its streets straight, wide, and adorned with avenues of trees. E. has a large arsenal within the walls, and is protected by six bastions. A considerable trade is carried on here in the produce of the surrounding districts; and an annual fair is held, which is attended by many thousands of dealers; commerce is also carried on with Poland and Moldavia. In the immediate neighborhood of the town there are upwards of 30 wind-mills. Great numbers of cavalry are always present in E., as it is the head-quarters of the military colonies e. of the river Bug. Pop. '67, 31,968.

ELIZABETH, a city and seat of justice in Union co., N. J., on Newark bay and Staten Island sound, 12 m. s.w. of New York; on slightly elevated ground on both sides of the Elizabeth river; reached by the New Jersey Central and the Pennsylvania railroads. It was settled under the name of Elizabethtown in 1665, and was the colonial capital from 1755 to 1757. It is well laid out with broad and well-shaded streets, and contains several small parks and many handsome residences. It is the home of a large number of men who do business in New York and travel to and fro daily upon one or the other of the railroads which meet and cross each other near the center of the city. The port is accessible for vessels of 300 tons, and receives large quantities of coal and iron brought by rail from the Pennsylvania mines for transhipment. A line of steam-

boats plies daily between Elizabethport and New York; a private company supplies the city with water from Elizabeth river; the streets are lighted with gas and paved. The property of the city was assessed in 1873 at $15,563,625—probably not more than one third of its real value. Among the public institutions are an almshouse, orphan asylum, and old ladies' home. The schools, having an average attendance of from 2,500 to 3,000 children, are well cared for. The amount appropriated for their support in 1873 was $32,000. There is a business college and a collegiate school for young men, besides several private schools. There are 24 churches, the denominations represented being Presbyterian, Roman Catholic, German Moravian, Baptist, Methodist, Episcopal, Congregational, and German Lutheran. The periodicals are three daily, one semi-weekly, and one monthly. The principal manufactories are of sewing-machines, cordage, edge tools, gas machinery, boots and shoes, carriages, zinc, combs, pottery, trunks, stoves, saws and hats. There also several foundries, breweries, and planing-mills. There are two national banks, with a total capital of $600,000, 3 savings-banks, and several insurance companies. The city is at present in a state of financial embarrassment on account of debts incurred for public improvements of a speculative character. Pop. in '70, 20,832, of whom 6,752 were of foreign birth.

ELIZ'ABETH, Queen of England, was the daughter of Henry VIII. and the unfortunate Anne Boleyn, and was b. 7th Sept., 1533. While she was yet in her third year, her mother was beheaded. After her mother's execution, she was sent to the country, where, in comparative poverty and seclusion, under the care of ladies who leaned to the "new learning," and sometimes, though seldom, with the companionship of her brother Edward, or her sister Mary, the greater part of her early youth was spent. When Catharine Parr became queen, E., who was a favorite with her, was more seen at court; but from some unknown cause, she incurred her father's displeasure, and was again sent to the country. Her father died when she was 13 years old. During the reign of her brother Edward, her life passed quietly and peacefully. She was then remarkable for a great demureness and sobriety of manner, discoursing with her elders with all the gravity of advanced years. Edward used to speak of her as his "sweet sister Temperance." During her sister's reign, this demureness was exaggerated into prudery, and the vanity which, in after years, with ampler means at its command, displayed itself in the utmost profusion of personal decoration, then sought for distinction by excess of plainness. Her Protestantism, and the way in which court was paid to her by the Protestant nobility, caused uneasiness to Mary and her council. On her sister's command, she conformed to papacy, but the insincerity of the conformity imposed upon no one. Upon the pretext of having been concerned in Wyatt's rebellion, she was sent in 1554 to the Tower. She entered it with all the gloomy forebodings which the fate of so many royal ladies who had been recently within its walls, could suggest. In daily fear for her life, many months passed. Indeed, the warrant for her execution was at one time prepared; and it is unquestionable that the stern bigotry of Mary and her councilors, Gardiner and Bonner, would have sacrificed E., but for the fear of popular commotion. The people, however, regarded E. with great favor, and many already looked forward to the time when the death of Mary should free the court from foreign influence, and give room for a milder government. Thus the life of E. was saved, but for some time longer she was kept a prisoner at Woodstock. During the remainder of Mary's reign, E., though occasionally at court, resided chiefly at her residence of Hatfield house, in Hertfordshire, where she occupied herself with feminine amusements, and the study of classical literature, under the learned Roger Ascham.

When Mary died (17th Nov., 1558), E. was 25 years of age. Her accession was welcomed alike by Catholic and Protestant. The former were, outwardly at least, the majority in Mary's reign; but among them were few who really cared for the peculiar doctrines of the Roman church, and there were many who were weary of priestly interference, foreign dictation, and cruel persecution. Like E. herself, there were many who had conformed merely to save themselves from trouble. They had obeyed the Six Articles in Henry's time; had agreed to the Protestant settlement of Edward; had turned with queen Mary, and were now ready to turn again with queen Elizabeth. The Protestants, of course, who had never believed the sincerity of E.'s conformity, welcomed her to the throne. E. then began, amidst dangers and difficulties, a reign which, contrary to the expectation of all, was of unexampled length and prosperity. It would be wrong not to attribute to her influence some effect in producing the great changes which, during the next 44 years, took place in England; but so far as these changes were not produced in the natural course of the development of the nation's powers, and so far as they bear the mark of an individual mind, they bear much more the impress of the bold yet cautious judgment and clear intellect of the great minister, Cecil, than of the sovereign's will. It is to the highest praise of E. that her first act on succeeding was to consult with such a man, and that to the very last she could bend her capricious temper to his control.

How the government influence was to be directed, was not long in being shown. Till parliament should meet, E. issued a proclamation that the English language should be used in the greater part of the church service, and that the host should not be elevated by the priest during mass. This sufficiently indicated into what hands power

had passed, and was enough to throw the mass of the indifferent to the side of the Protestants, and to cause a Protestant majority to be returned to E.'s first parliament. The acts of this parliament must be ever memorable in our history. It was then that England took its position as a Protestant power. The Book of Common Prayer, retaining, doubtless, some mixture of mediæval thought, but still vivid with new energy, was appointed to be used in all churches; the Thirty-nine Articles were settled as the national faith; the queen was declared to be head of the church. Thus all allegiance to Rome was thrown off. This revolution was soon accomplished and with little turmoil. The bishops, with one exception, refused to conform; but as a sign of the times, marking how thoroughly the priesthood must have become demoralized before their power was lost, it is noteworthy that of the 9,000 clergymen who held livings in England, there were fewer than 200 who resigned, rather than obey the new order of things.

The policy of E.'s ministers was one of peace and economy. They found the nation at war with France and Scotland, and one of their first acts was to secure peace upon favorable terms. Ever afterwards, they followed the same path. No war was undertaken in her reign for the sake of territorial conquest. To strengthen her own throne, E. secretly succored the Protestants in Scotland, in France, and in the Low Countries; but she had few open wars. To be at peace with a government, nay, apparently to be upon the most amicable terms with it (as E. was with the French court, while she sent assistance to the Huguenots at Rochelle), and at the same time to aid its rebellious subjects, was in those days thought only part of the politic dissimulation, without which, it was believed, no nation could be safely ruled. To maintain the security of her own throne, and to prevent foreign interference in English matters, was the mainspring of E.'s foreign policy; and she lost no opportunity of weakening and finding occupation abroad for any foreign power that unduly threatened her authority.

The one great blunder of England's policy was the treatment of Mary Queen of Scots. Had E. pursued a straightforward course, when her rival was thrown into her hands, much evil might have been spared. Some of the English ministers were prepared to take effectual measures to remove a life which might be turned into so dangerous a tool in the hands of Catholics. E. shrank from that course, but had not the courage and generosity to set queen Mary at liberty. Had this course been taken, Mary would have gone to France or Spain, would have made a foreign marriage, and as a foreigner would have lost the only sources of her real power—the sympathies of the Scotch and English Catholics. As it was, E. retained her a prisoner, and thus for years gave cause to conspiracy after conspiracy among the English Catholics. For a rebellion incited to set Mary free, the richest and most popular of the English nobility, Norfolk, was executed. The discovery of every new plot led to demands, on the part of parliament, for the execution of Mary. The plots then took a graver aspect. The assassination of E., and the placing of Mary on her throne, became the object. On the discovery of Babington's conspiracy for this purpose, the popular cry was irresistible, and was joined in by Cecil and Walsingham, and others of E.'s ministers, who had sinned too deeply against Mary to run the risk of her succession to the throne. With reluctance and hesitation, the sincerity of which need not be questioned, E. consented; and Mary, after long years of confinement, was condemned and executed.

This led to new evils. The participation of the Catholic party in the plots was retaliated by persecution. Many suffered under an act passed in 1585, making it treason for a Catholic priest to be in England, and felony to harbor one. These cruel measures were the ultimate means of bringing upon England the most menacing foreign attack which she had suffered. Philip of Spain had long meditated vengeance against England. The greatest state in Europe, enriched by splendid acquisitions in the new world, could ill brook that a power of the second rank should incite rebellion among her subjects in the Netherlands, should aid the Protestants in their desperate struggle against Alva, and allow its ships (little better than pirates, it must be confessed) to enter the Spanish harbors, and cut out the rich laden galloons. These were the real reasons: to restore the Catholic faith, and to revenge the death of a Catholic queen, furnished ostensible reasons. Years had been spent in preparation. In 1588, the "invincible armada" sailed from the Tagus, manned by 8,000 sailors, and carrying 20,000 soldiers. To aid these, a land-army of 100,000 men was to be transported from the Netherlands under the duke of Parma. The news roused all England, and every man who could carry arms—Protestant and Catholic from 18 years of age to 60—was enrolled in the forces. The old queen herself rode at Tilbury, energetically encouraging the army. A fleet of 200 vessels and 15,000 seamen gathered itself on the southern coasts, and waited the attack. Superior skill and courage gained the victory for the English; and what these had begun, the force of the elements completed. The splendid armada was broken and destroyed before it could join the land-army, not a soldier of which ever left foreign ground; while not a seaman of the fleet, save those whom shipwrecks sent, ever set foot on English ground.

E. died on 24th Mar., 1603, having lived nearly 70, and reigned nearly 45 years. If the life of her rival, Mary of Scotland, read somewhat like a tragedy, the private life of E. might afford abundant materials for comedy. Always parading her wish to live an unmarried life, E. coquetted with suitor after suitor till long after that period of life

when such proposals verge upon the ridiculous. Of her father's schemes to marry her to the Scotch earl of Arran or to Philip the son of Charles V.—afterwards husband of Mary—it is unnecessary to speak, for E. had personally little to say in regard to them. But she was scarcely more than a child when her flirtations with the handsome lord admiral Seymour—the brother of the protector Somerset—had passed the bounds of decorum. In Mary's reign, E. was flattered with the attentions of her kinsman, the earl of Courtenay, and she declined the hand of Philibert of Savoy, pressed on her by her sister's council. When queen, with some hesitation she refused the offer of Philip II., who was desirous of perpetuating his influence over England, and she began that connection with Leicester, which so seriously compromised her character. It is certain that she loaded him with honors as soon as she had them to bestow; allowed him to become a suitor for her hand within a few days after the sudden death of his wife, Amy Robsart, attributed by all England to his agency; and allowed him to remain a suitor long after his open profligacy had disgusted the nation, and had even opened her own eyes to his worthlessness. If we credit the scandal of the times, the intimacy was of the most discreditable kind. If we credit those sources of information, recently turned to more profit by Mr. Froude than by any of his predecessors, which are found in the dispatches of the bishop of Aquila, ambassador of Philip II. in London, preserved in the archives of Simancas, not only was the moral character of E. sullied with the darkest crimes, but even the quality for which she has ever been most honored, her English patriotism, was mere affectation. These dispatches represent her as accessory —at least, after the fact—to the murder of Amy Robsart, and as offering to Spain to become a Catholic, and to restore the Spanish ascendency in England, if Philip would support her on the throne as the wife of Leicester; and they represent her as being restrained from giving way to the fatal consequences of her wild passion only by Cecil's control. That there is some basis of truth in this revelation, it is scarcely possible to deny; but the hatred with which Philip regarded E. after her refusal to marry him, has undoubtedly led the courtly bishop to gross exaggerations. It is undeniable, however, that had E. followed her own inclinations, she would have married Leicester. Her ministers, wisely for the nation, prevented this, but E. never seriously entertained another proposal. Cecil could prevent her marrying whom he would not, but he could not force her to marry whom he would. Among less distinguished suitors, the archduke Charles of Vienna, and prince Eric of Sweden, pressed their suit in vain. Petitions from parliament to the queen to marry, only excited her maidenly wrath, and produced dignified replies that she would attend to the matter when the time came. Years passed on, and she remained a spinster. Catharine of Medici, queen-mother of France, intrigued to marry her to one of her sons, Henry of Anjou (afterwards Henry III.), or the duke of Alençon, afterwards duke of Anjou. When the foreign envoys pressed the suit of the latter, E. was 38 years of age, and her suitor 19; but they ingeniously flattered her that she and he looked of the same age, for she, by her good preservation, looked nine years younger than she was; while the duke, by his wisdom, gravity, and mature intellect, looked nine years older. This flattery, with more plausible attractions, was without effect.

E.'s position gave too much scope for the development of the unamiable and ridiculous features of her character. The personal vanity displayed in her extravagant dress, her conversation, her "high and disposed" dancing, excites a smile, not lessened when we read of the irritable mistress boxing the ears of her councilors, cuffing her attendants, indulging in expressive masculine oaths, and amusing herself with rough masculine sports. The assertion that she was of a cruel disposition is false. That she could do cruel things when her vanity was concerned is sufficiently attested by her ordering the right hand of a barrister, named Stubbes, to be struck off for writing a remonstrance against her marriage with the duke of Alençon, which she thought unduly reflected on herself; but in her reign, the reckless waste of human life which marked the reigns of her predecessors was unknown. She was not, however, of fine feelings. Her brother could compliment her on the calm mind and elegant sentences with which she replied to the communication of the death of her father. On the news of her sister's death, she burst out with rhapsodical quotations from the Psalms; and when she heard of the execution of her lover Seymour, she turned away the subject with something like a jest. By her attendants, she was more feared than loved. The one quality which never failed her, was personal courage; and when she chose, her demeanor was stately and royal. Religion was with her, as with a great proportion of the nation at that time, a matter more of policy and convenience than of feeling or principle. She preferred Protestantism, from early associations, because it gave her the headship of the church, freed her from foreign interference, and was more acceptable to her ministers and to the nation. But she had conformed in Mary's time to Catholicism with little difficulty; and, had there been necessity for it, she would rather have reigned a Catholic than not have reigned at all. To the last, she retained in her private chapel much of the ritualism of the Roman church; and while refusing her Catholic subjects the exercise of their religion, she entertained the addresses of Catholic suitors. How thoroughly incapable she was of appreciating a matter of religious principle may be gathered from the fact, that she looked upon the great Puritan movement, destined soon afterwards to play so impor-

tant a part in the nation's development, as some frivolous controversy about the shape of clerical vestments. Of toleration, then well enough understood by Bacon and the more advanced spirits of the age, she had no conception.

What makes the name of E. so famous, was the splendor of her times. In her long reign, the true greatness of England began. Freed from the possession of those French provinces which rather harassed than enriched—with little domestic commotion—with no great foreign wars—with an almost complete immunity from religious persecution, the nation turned to the arts of peace. An unequaled literature arose. The age that produced Spenser, Shakespeare, and Bacon could not be other than famous. Under Frobisher and Drake, maritime adventure began, and the foundations of our naval force were laid. Commerce, from being a small matter in the hands of a few foreign merchants, developed itself largely. The exchange of London was opened in E.'s time; and in the charter which she granted to that company of merchant adventurers, which afterwards took the name of the East India company, may be seen one of the small beginnings of our vast colonial empire. The social condition of the people also greatly improved in her reign. The crowds of vagabonds which the monastic institutions had fostered, and who had pillaged the country in all ways on the secularization of the monastic property, died out, or were absorbed in industrious employments. The last traces of bondage disappeared. Simultaneously with the growth of greater comfort and intelligence in the people, parliament began to assert, with greater vigor, its constitutional rights. The right of the commons to free speech, and to initiate all money-bills, was steadily asserted, and the right of the crown to grant monopolies, or to issue proclamations having the force of law, vigorously assailed. In the later years of her reign, the attempts of E. to gain arbitrary power, and her caprices, had forfeited the popularity which she so anxiously cultivated. But after her death, her fame revived; and during the time of the Stuarts, amid the jealousy of the Scotch, the troubles of the civil wars, and the hatred of a Catholic sovereign, the nation looked back with fond regard to the long reign of the "Good Queen Bess," when peace had prevailed, and the government had been thoroughly English.

ELIZABETH, CHRISTINA, 1715–97; Queen of Prussia, wife of Frederick the great. Although Frederick was decidedly opposed to the marriage, to which he was compelled by his father, he spoke very highly, in after years, of her high and winning character. She wrote a number of works in the French language.

ELIZABETH, SAINT, daughter of Andreas II., king of Hungary, was b. at Presburg in 1207. At the age of four, she was affianced to the landgraf of Thuringia, Louis IV., called the pious, and brought to his court to be educated under the eyes of the parents of her future husband. She early displayed what may be called a passion for the severities of the Christian life, as it was conceived in those days. She despised pomp, avarice, ambition; cultivated humility, and exhibited the most self-denying benevolence. Her conduct, even as a girl, astonished the Thuringian court; but such was the grace and sweetness of her disposition, and the excellence of her beauty, that Louis—though her affections seemed to be given wholly to God—still wished to marry her. They were united when E. was only 14. Louis himself, far from blaming the devout girl whom he had made his wife for her long prayers and ceaseless almsgiving, was himself partially attracted to a similar mode of life. A boy and two girls were the fruit of their union; but the happiness of E., in so far as it depended on anything earthly, was shattered by the death of her husband in 1227, when absent on the crusade headed by Barbarossa. Her confessor, Conrad of Marburg, a narrow fanatical monk (to whose miserable teaching E. mainly owed her perverted idea of life and duty), had trained her to stifle the emotions of her nature as sinful, and the poor widow hardly dared to bewail her loss. Great misfortunes soon befell her. She was deprived of her regency by the brother of her deceased husband, and driven out of her dominions on the plea that she wasted the treasures of the state by her charities. The inhabitants of Marburg, whose miseries she had frequently relieved, refused her an asylum, for fear of the new regent. At last she found refuge in a church, where her first duty was to thank God that he had judged her worthy to suffer. Subsequently, after other severe privations, such as being forced to take up her abode in the stable of a hostelry, she was received into the monastery of Kitzingen by the abbess, who was her aunt. When the warriors who had attended her husband in the crusade returned from the east, she gathered them round her, and recounted her sufferings. Steps were taken to restore to the unfortunate princess her sovereign rights. She declined the regency, however, and would only accept the revenues which accrued to her as landgravine. The remainder of her days were devoted to incessant devotions, almsgivings, mortifications, etc. There is something mournfully sublime in her unnatural self-sacrifice. We shudder even in our sympathy when we read of this beautiful tender-hearted creature washing the head and the feet of the scrofulous and the leprous. Murillo has a painting (now in the museum at Madrid) of this act of evangelical devotion. The solemn tragedy of her brief life assumed towards its close a ghastly intensity through the conduct of her confessor, Conrad, who, under pretense of spiritual chastisement, used to strike and maltreat her with brutal severity. The alleged cause of this was Conrad's aversion to her "squandering" her money among the poor. Perhaps he thought it should have gone

to *him*. At last her health gave way; and on the 19th Nov., 1231, at the age of 24, E. died, the victim partly of ill-usage and partly of a mistaken theory of religious life, but as gentle and saintly a soul as figures in the history of the middle ages. She was canonized four years after her death. See Montalembert's *Histoire de Sainte Elisabeth de Hongrie* (Paris, 1836). The Rev. Charles Kingsley's dramatic poem, entitled *The Saint's Tragedy* (London, 1848), is founded on the story of E.'s life.

ELIZABETHAN ARCHITECTURE, a term applied to the mixed style which sprang up on the decline of Gothic architecture. By some it is called the Tudor style, but that name belongs more correctly to the perpendicular, or latest kind of Gothic. The Elizabethan is chiefly exemplified by mansions erected for the nobility in the reigns of Elizabeth and James I., and originated in the first attempt to revive classic architecture, influenced, no doubt, by Holbein, who was patronized by Henry VIII., and furnished several designs in this manner. John of Padua succeeded him, and built in the mixed style a palace for the protector Somerset (for which purpose the cloisters of St. Paul's were taken down), and the mansion of Longleat for his secretary, sir John Thynne. The vast dimensions of the apartments, the extreme length of the galleries, and enormous square windows, are the leading characteristics of this manner of building. The ornaments both within and without were cumbrous; nothing could exceed the heaviness of the cornices and ceilings wrought into compartments; in short, the architecture was just in keeping with the dress of the period, rich and gorgeous, rather than elegant, graceful, and comfortable. The following examples of mansions of the 17th c. may be still seen near London: Holland house, Campden house; and the following in Kent: Sir T. Willow's at Chariton, the marquis of Salisbury's at Hatfield, and Knowle, the property of the duke of Dorset. The most eminent architects of those times were John Thorpe, Gerard Christmas, Rodolph Symonds, and Thomas Holt.

ELIZABETH CITY, a co. in s.e. Virginia, on James river and Chesapeake bay; 50 sq.m.; pop. '70, 8,303—5,471 colored. Corn and wheat are the staple products. Co. seat, Hampton.

ELIZABETH ISLANDS, a group s.w. of cape Cod, between Buzzard's bay and Vineyard sound, forming the town of Gosnold, Dukes co., Mass. There are 16 islands, the most important of which are Naushon, Cuttyhunk, Pasque, and Nashawena; pop. of the whole group (permanent residents) about 100. The islands have a fine climate, and afford excellent fishing. On Cuttyhunk island the foundations of the first English colony of New England were laid, in 1602, by Bartholomew Gosnold, but the place was abandoned a few weeks later. On another island, Penikese (area 100 acres), a school of natural history, connected with Harvard college, was established 1873, but discontinued in a few years.

ELIZABETH PETROV'NA, empress of Russia, daughter of Peter the great and Catharine I., was b. in the year 1709. On the death of Peter II., in 1730, she allowed Anna, duchess of Courland, to ascend the throne, she herself being apparently indifferent to anything but the indulgence of her passions. Anna died in 1740, and Ivan, the son of her niece (also called Anna), an infant of two months, was declared emperor, and his mother regent during his minority. Shortly after this, a plot was formed to place E. upon the throne; the two principal agents in it were Lestocq, a surgeon, and the marquis de la Chetardie, the French ambassador. The officers of the army were soon won over; and on the night of the 5th Dec., 1741, the regent and her husband were taken into custody, and the child Ivan conveyed to Schlüsselburg. The leading adherents of Anna were condemned to death, but pardoned on the scaffold, and exiled to Siberia. By eight o'clock in the morning, the revolution was completed, and in the afternoon all the troops did homage to the new empress. La Chetardie was handsomely rewarded; and Lestocq was created first physician to the empress, president of the college of medicine, and privy councilor. E., however, did not possess the qualities requisite in a ruler. She wanted energy, knowledge, and love of business, and allowed herself to be guided by favorites. In order to strengthen her position, E. took pains to win over her nephew, the young prince Peter, the son of her sister, the duchess of Holstein-Gottorp. She summoned him to Petersburg in the year 1742, and proclaimed him her successor. E. took part in the Austrian war of succession, and in spite of the opposition of France, dispatched an army of 37,000 men to the assistance of Maria Theresa, and thereby hastened the conclusion of the peace of Aix-la-Chapelle in 1748. E. showed herself less placable towards Frederick II., against whom she cherished a personal enmity, excited by some severe expressions he had employed respecting her. At the commencement of the seven years' war, she allied herself with Austria and France, and marched her troops into the Prussian states. Her troops gained the victory in the battles of Grossjägerndorf and Kunersdorf, and took possession of Berlin, but without any decisive result. E. died before the expiration of the war, 5th Jan., 1762. She founded the university of Moscow and the academy of art at St. Petersburg. Though no person was put to death during her reign, the most shocking punishments were inflicted, and thousands were exiled to Siberia and Kamtchatka. E. had several illegitimate children. Profligacy, espionage, and persecution reigned in her court, the administration of justice was restrained, and the finances neglected; but E. was nevertheless extremely strict in the observance of the public ordinances of religion.

ELIZABETH STUART, queen of Bohemia, remarkable not only as a heroine, but as forming the connecting link between the ancient royal families of England and Scotland and the present reigning dynasty, was b. in the palace of Falkland (q.v.) on the 19th of Aug., 1596. On the accession of her father, James VI. of Scotland, to the crown which fell to him by the demise of queen Elizabeth, in 1603, she accompanied the family to England, where she was educated. On the 14th of Feb., 1613, E. was married to Frederick, elector-palatine, whom she soon after accompanied to his residence, the castle of Heidelberg (q.v.); see also PALATINATE. When the Protestant princes of Germany sought for a fitting person to fill the throne of Bohemia, they made choice of Frederick, who accepted the perilous honor, partly, perhaps, from the ambition of his wife, who is alleged to have longed for the title of queen. The palatine removed with E. and three children to Prague, which they entered Oct. 21, 1619. Frederick and E. occupied the throne of Bohemia only about a year. By the forces of the Catholic league, the army of Frederick was routed at the battle of Prague, Nov. 8, 1620, and the royal family fled into exile, for already the palatinate was laid waste. With her husband and children, and a few faithful attendants, E. took up her residence at the Hague, and ever afterwards the family lived in a state of dependence. E. was the mother of 13 children, the eldest of whom was accidentally drowned in Holland, and 3 others died young. The next were Charles-Louis and Rupert, and, following in order, were Elizabeth, Maurice, Edward, Philip, Louisa, Henrietta Maria, and Sophia. From this numerous offspring, E. derived little comfort in her misfortunes. Charles-Louis was a selfish, calculating person, with low, disreputable habits. Rupert (q.v.) the "mad cavalier," and his brother, Maurice, fought in England during the civil war, and, after the loss of the royalist cause at the battle of Naseby, they betook themselves to the sea, and for some time were little better than pirates. Edward, in 1645, abjured Protestantism, and was admitted into the Roman Catholic church. Philip committed an assassination at the Hague, fled from justice, became a soldier of fortune in France, and was slain in the civil wars. Elizabeth accepted the office of superior of the Lutheran abbey of Hervorden, Henrietta-Maria was espoused by Ragotzi, prince of Transylvania, but died shortly after her marriage. Louisa fled to France, and died as abbess of Maubisson. Previous to these events, E. became a widow by the death of Frederick, Feb. 17, 1629, when his right to the palatinate devolved on Charles-Louis, who, by the treaty of Westphalia, was restored to the family inheritance, Oct. 24, 1648. This favorable turn of affairs did not mend the fortunes of E., who was scandalously neglected by her son, the young elector-palatine; and all he would do for the family was to give a shelter to his youngest sister Sophia, until she was married to Ernest-Augustus, a scion of the house of Brunswick, who ultimately succeeded to the electorate of Hanover.

Deprived, in one way or other, of all her children, the queen of Bohemia—by which title she continued to be known—resolved to quit Holland. Relieved of her debts by the sale of jewels, and by aid of a pecuniary subsidy from the British parliament, she embraced an invitation from her nephew, Charles II., to come to England. She arrived May 17, 1661. From this time she was in a great measure indebted to the hospitality of lord Craven, in a mansion which he had purchased from sir Robert Drury, in Drury lane, London. Charles II. paid her little attention; but at her death, which occurred Feb. 13, 1662, he caused her remains to be interred in Westminster abbey. Charles-Louis, her son, died in 1680, leaving a son, who died without issue, and the palatinate then went to a distant branch of the family; he left also a daughter, Charlotte-Elizabeth, who, in 1671, had married Philip, duke of Orleans, only brother of Louis XIV. In 1674, she gave birth to a prince, who became the noted regent of France during the minority of Louis XV. She died at St. Cloud in 1722. The late Louis-Philippe, king of the French, was her lineal descendant. When, in 1708, the question of succession to the crown of Great Britain was debated, it was found that all the descendants of James I. were either dead or were Roman Catholics, except Sophia, electress of Hanover, and her family. By act of parliament, that year, the crown was accordingly secured to her and her descendants, "being Protestants;" and in virtue of this act of settlement, on the death of queen Anne, Sophia would have ascended the throne, but she predeceased the queen three months, and her son became sovereign of these realms as George I., Aug. 12, 1714. In this extraordinary and unforeseen manner did a grandson of the unfortunate queen of Bohemia become king of England, and originate the dynasty of the reigning monarch. The *Memoirs of Elizabeth Stuart, Queen of Bohemia*, by Miss Benger, 2 vols., may be perused as an accurate and pleasing piece of biography.

ELIZABETO'POL, a government in Asiatic Russia bordering on Persia; 17,038 sq.m.; pop. 503,282. The principal city bears the same name.

ELIZABETO'POL, a t. of Russian Transcaucasia, is situated in lat. 40° 42′ n., long. 46° 20′ east. The town consists of three parts, one of which is fortified with a bastioned wall. Its principal buildings are its churches and mosques, of which there are many. The town is remarkable for its numerous fruit-gardens and vineyards. Horticulture, the rearing of silk-worms, bees, and cattle, with agriculture and mining, are the chief occupations of the inhabitants. Pop. '67, 14,971, principally Tartars and Armenians.

ELK, a co. in central n.w. Pennsylvania, on the head waters of Clarion river, intersected by the Philadelphia and Erie, and Pennsylvania railroads; 700 sq.m.; pop. '70,

8,488. The surface is rough; coal-mining and lumbering are the leading occupations. Co. seat, Ridgeway.

ELK, IRISH, *Megaceros Hibernicus*, a large deer found in the pleistocene strata. There is a double error in its popular name, for it is a true deer, between the fallow and reindeer, and though abundant in Ireland, it is not peculiar to that country, being found also in England, Scotland, and on the continent of Europe. In Ireland, it occurs in the shell marl underlying the extensive turbaries. In England, lacustrine deposits and brick-clay contain its remains, and, associated with the mammoth and rhinoceros, they are found also in ossiferous caves. The most striking feature in this animal was its enormous antlers. A straight line drawn between their extreme tips in one specimen measured 10 ft. 10 inches. The form of the antler differs from that of any living species of deer. The beam enlarges and flattens into a palm; a brow snag exists as in the fallow-deer, but in adult specimens, this bifurcates and expands somewhat as in the reindeer—a peculiarity never observed in the fallow-deer group. The antler is also furnished with a back snag. Some idea of the enormous size and weight of the antlers may be formed from the fact that, in a specimen where the head weighed 5½ lbs., their weight was 81 lbs. To sustain this, the vertebræ of the neck and the limbs are very much larger and stronger than in any other deer. A fine and almost perfect specimen of this animal, from the Isle of Man, exists in the Edinburgh museum.

ELK, MOOSE, or MOOSE DEER, *Alces malchis*, or *cervus alces*, the largest existing species of the *cervidæ*, or deer family, is a native of the northern parts of Europe, Asia, and America. When full grown, it is about 6 ft. in height at the shoulders, and sometimes weighs 1200 lbs. The body is round, compact, and short; the neck is short and thick, unlike that of deer in general, but thus adapted for sustaining the great weight of the head and horns. The head is very large, narrow, about 2 ft. long. The horns in males of the second year are unbranched, not flattened and about 1 foot long; as the animal becomes older, they begin to display a blade, with more numerous snags, and in mature elks the blade becomes very broad, the snags sometimes 14 on each horn; a single antler has been known to weigh about 60 lbs. The horns have no basal snag projecting forwards. The ears are long, and have been compared to those of the ass. The eyes are small. The limbs are long, and very graceful. The tail is only about 4 in. long. The body is covered with coarse angular hair, which breaks when it is bent. On the neck and withers there is a heavy mane, and the throat is covered with long hair. A large goitre-like swelling under the throat of the younger elks has a very curious appearance. The hoofs of the E., like those of the reindeer and of the buffalo, are so constructed as to part widely, and to afford a better footing on soft marshy ground or on snow; they make a clattering when it runs. In running, it carries its muzzle forward, with the horns thrown back upon the neck, so that they may not be caught by branches. Its shoulders being higher than the croup, its common gait is a shambling trot; but it can also gallop with great rapidity. The color of the elk is brownish black, darker in winter than in summer; the limbs, the sides of the head, and the mane are of a lighter color than the body. Elks are sometimes seen in small herds, but often singly; they are now very rare in Europe, and are no longer found in parts of North America in which they were once common. They formerly extended as far s. as the Ohio. They are sometimes seen even on the shores of the Arctic ocean. They delight in marshy districts and in forests. When compelled to eat grass, they must get down on their knees to reach it; their proper food consists of the branches and foliage of shrubs and trees. They are very timid and inoffensive, except during the rutting season. A single stroke of an elk's fore-foot is sufficient to kill the strongest dog. It is also an extremely wary animal, and is with the greatest difficulty approached by the hunter. Its sense of smell is very acute, and the slightest sound excites its alarm. It is, however, much sought after in North America. In Sweden, its destruction is prohibited; and in Norway is placed under legal restrictions. The flesh of the elk is esteemed a good kind of venison; the fat is remarkably soft; the nose and the tongue are reckoned delicacies. The skin is used for a variety of purposes.

The elk is easily domesticated, and was at one time employed in Sweden for conveying couriers, being capable of traveling more than 200 m. in a day when attached to a sledge.

The elk of Ceylon is a deer of the group to which the name *rusa* has been given.

ELKESAI'TES, or ELCES'AITES, Jewish Christians of the 2d c., who held as the highest authority a work known as the *Book of Elxai*. This book was known to Origen, who reports that it was believed to have fallen from heaven, and was revealed by an angel who was the son of God. Its contents were made known only upon a pledge to keep them secret. Apparently the object of the sect was to mingle Judaism and Christianity, so that the Hebrews of that day could embrace the new doctrines without entire repudiation of their old belief. The fullest account of the *Book of Elxai* is found in the *Philosophonmena* of Hippolytus.

EL-KHAR'GEH, capital of the Great Oasis, Upper Egypt, is situated in lat. 25° 28′ n., long. 30° 40′ east. In the vicinity of the town are numerous ruins, among which are those of a temple; there is also a remarkable necropolis. Pop. 6,000.

ELKHART, a co. in n. Indiana, on the Michigan border, intersected by the St. Joseph's river and the Lake Shore and Michigan Southern railroad; 467 sq.m.; pop. '70, 26,026. The surface is generally level, with extensive oak and maple forests. The soil is fertile, producing wheat, corn, etc. Co. seat, Goshen.

ELKHART, a city in Elkhart co., Ind., on St. Joseph's river, and Lake Shore and Michigan Southern railroad, 101 m. e. of Chicago; pop. '70, 3,265. Three rivers converge here, affording abundant water power, supplying a rolling mill and many other manufactories.

ELKO, a co. in n.e. Nevada, drained by the sources of the Humboldt and Owyhee rivers, and crossed by the Central Pacific railroad; 13,800 sq.m.; pop. '75, 3,602. The surface is rough, 5 or 6 mountain ranges running n. and s. through the co., between which are wide and almost barren plains, with some rich bottom lands along the rivers. There are valuable mines, especially of silver. Co. seat, Elko.

ELKO, a village and seat of justice in Elko co., Nev., on the n. fork of the Humboldt river, and on the Central Pacific railroad; 460 m. n.e. of Sacramento; pop. about 1200. The place has a large trade with the mining districts. It is the seat of the state university.

ELL (allied to *el*bow, Ger. *ellen*bogen, Lat. *ulna*, the fore-arm or arm in general) is a measure of length now little used. It was originally taken in some vague way from the arm, and hence has been used to denote very different lengths. The Latin ulna appears to have denoted sometimes the measure from the elbow to the tips of the fingers, sometimes that between the outstretched hands. The English ell, as a measure of cloth, is equal to five quarters of a yard (q.v.).

ELLAG'GIC ACID, a constituent of animal secretions such as the bezoar stones found in the antelope. It may be produced by the decomposition of gallic acid.

ELLENBOROUGH, EARL OF. Edward Law, first earl of E., son of the first baron (many years chief-justice of the king's bench), was b. 1790; educated at Eton and at St. John's college, Cambridge, where he graduated M.A., 1809; succeeded his father in the barony in 1818; was lord privy seal in the duke of Wellington's administration, 1828–29; president of the board of control during the short-lived Peel administration of 1834–35; and appointed, on the return of sir Robert Peel in Sept., 1841, to the same office, which he relinquished a month afterwards for the post of governor-general of India. He received the thanks of parliament in 1843 for his "ability and judgment" in supporting the military operations in Afghanistan. In many other respects, his Indian administration was open to censure. He was charged with reserving his favor for the military, and inflicting undeserved slights upon the civil servants of the company. He made showy progresses; addressed proclamations to the rulers and natives of India which appeared to sanction idolatry; and, finally, in his proclamation concerning the sandal-wood gates of the temple of Juggernaut, when brought back from Ghuznee, he reached the climax of a series of extravagances, which induced the directors of the East India company to exercise a power only used in extreme cases, and to recall him. The ministry, however, stood by him, and he was created by the crown an earl and a viscount; he also received the distinction of G.C.B. In 1846, sir R. Peel made him first lord of the admiralty, an office which he resigned in July of the same year, when the disruption of the Peel administration took place. In the Derby administration of 1858, he was again minister for India, and the author of an India bill, which failed to obtain the sanction of parliament. Having permitted a dispatch to see the light, in which he had administered a severe and caustic rebuke to viscount Canning, governor-general of India, an outcry was raised against him, which threatened the existence of the Derby government. To avert this result, lord E. resigned. He afterwards took a frequent and influential part in the debates of the upper house. He was styled, by no less a judge than M. Guizot, "the most brilliant of the tory orators." He was twice married—first to a daughter of the marquis of Londonderry, and second to the daughter of admiral Digby. His divorce from the latter made some noise at the time. E. died without issue, Dec. 2, 1871, when the earldom and viscounty became extinct.

ELLENBOROUGH, EDWARD LAW, Lord, 1750–1818; chief-justice of the court of king's bench; educated at Cambridge, and a fellow of Trinity college; studied law, and was called to the bar in 1780, speedily gaining a large practice and a high reputation. He was principal counsel for Warren Hastings in the famous impeachment trial. He began political life as a whig, but the French revolution made him a supporter of Pitt. In 1801, he was appointed attorney-general; the next year he succeeded to the king's bench as chief-justice, and at the same time was made a peer. He was also a member of the Grenville cabinet. As a judge he showed profound legal knowledge, and was especially an authority on mercantile law; but he was harsh and overbearing to counsel, and generally against any prisoner tried for a political offense. In the trial of Hone for blasphemy he directed the jury to return a verdict of guilty, but they brought in one for acquittal—an event which is thought to have hastened the judge's death.

ELLENRIEDER, MARIE, a female painter of very high excellence, was b. at Constance in 1791, studied in Munich, and in 1820 went to Rome, to perfect her knowledge

of art. Her admiration of the old German masters gave a religious bent to her genius. On her return to Germany, she resided for some time at Carlsruhe, where she painted a "Martyrdom of St. Stephen" as an altar-piece for the Roman Catholic church. She was afterwards appointed court-painter at Munich, but she chose to fix her residence at Constance, and devoted herself exclusively to her profession. Among her principal pieces are the "Transfiguration of St. Barthelemy;" "Christ Blessing Little Children;" "Mary and the Infant Jesus;" "Joseph and the Infant Jesus;" "St. Cecilia;" "Faith, Hope and Charity;" and a Madonna. Marie E. is reckoned in Germany the greatest female artist of the present age. So full of ideal grace and beauty are the heads of her women and children, in particular, that it has been said that "she seems to paint in the presence of angels;" her coloring, however, is gray, dull, and somber, like that which prevails among the old masters of the German school. She died in June, 1863.

ELLERY, WILLIAM, 1727–1820; b. R. I.; graduated at Harvard, and went into trade in Newport; afterwards began the practice of law, and in 1776 was elected to the continental congress, where, with his fellow member from Rhode Island, Stephen Hopkins, he signed the declaration of independence. With the exception of the two years 1780 and 1782 he was in congress until 1786, and was one of the most influential members. In 1790, he was appointed collector of customs at Newport, and held the office during life.

ELLESMERE, a t. in the n.w. of Shropshire, near a beautiful lake or mere, 19 m, n.n.w. of Shrewsbury. Pop. '71, 2,013. It has considerable malting establishments. On the present site of a bowling-green once stood an ancient castle, alternately held by the English and Welsh.

ELLESMERE, first EARL OF, politician, patron of the arts, and author. Francis Egerton, second son of the first duke of Sutherland, was b. 1800; graduated at Christ Church, Oxford, where he was second-class in classics, 1820; entered the house of commons, 1820, and represented successively Bletchingly, Sutherland co., and South Lancashire; filled the office of chief-secretary for Ireland from Jan., 1828, to July, 1830, and secretary at war from July to Nov., 1830; in 1833, assumed the name of lord Francis Egerton, in lieu of his patronymic Leveson-Gower. He achieved considerable literary distinction as a writer of graceful poems, translations from the German, etc. He also published a pamphlet on the defenseless state of the coasts and of the metropolis, which called forth some adverse criticism. He was a munificent patron of the arts, and made many valuable additions to the collection of pictures which he inherited with the large estates of the last duke of Bridgewater. He also built a noble gallery for their reception, which he liberally threw open to the public. After faithfully voting with the conservative party in parliament for a quarter of a century, he, on the retirement of the Peel administration in 1846, obtained a revival in his favor of the peerages of Ellesmere and Brackley. His last public appearance was in May, 1856, when he moved, in the house of lords, an address to the crown, approving of the treaty of peace after the war with Russia. He died in 1857 at his new mansion, Bridgewater house, London, and was succeeded in the earldom by his eldest son, viscount Brackley.

ELLET, CHARLES, Jr., 1810–62; b. Penn.; an engineer, builder of the first wire suspension bridge in the United States (over the Schuylkill, at Fairmount, near Philadelphia); architect of the first suspension bridge over the Niagara river below the falls, and of the first one at Wheeling. During the war of the rebellion he built a number of steam rams for the western rivers, with which he took part in the battle in the Mississippi at Memphis, June 4, 1862, sinking or disabling a number of confederate vessels. He received a wound on that occasion, from the effects of which he died.

ELLET, ELIZABETH FRIES, 1818–77; b. N. Y.; wife of William H., and author of sketches, poems, etc. At 17 years of age she published a volume of poems, and about the same time wrote *Teresa Contarini*, a tragedy based on Venetian history. In 1841, she published *The Characters of Schiller*, following with *Women of the American Revolution; Evenings at Woodlawn; Family Pictures from the Bible; Domestic History of the American Revolution; Watching Spirits; Pioneer Women of the West; Novelettes of the Musicians; Summer Rambles in the West; Women Artists in All Ages and Countries; Queens of American Society;* and *Court Circles of the Republic.* She was also a frequent contributor to periodicals.

ELLET, WILLIAM HENRY, 1804–59; b. N. Y.; graduated from Columbia college, where he was professor of chemistry in 1832; in 1835, professor of chemistry, mineralogy, and geology in South Carolina college. The South Carolina legislature presented him with a testimonial for the discovery of a cheap method of manufacturing gun-cotton. His latest work was that of consulting chemist to one of the great gas manufacturing companies of New York.

ELLEZELLES, a large village of Belgium, in the province of Hainault. Linen-weaving is extensively carried on. There are several flour-mills, breweries, and a salt-refinery. Pop. 6,200.

ELLICOTT, ANDREW, 1754–1820; b. Penn. His scientific attainments caused his employment at various times for marking the boundaries of Virginia, New York, and Pennsylvania; and in 1789 he surveyed the country between Pennsylvania and

lake Erie, making the first accurate measurement of Niagara river. In 1790, he laid out the proposed city of Washington, now the federal capital, and in 1796 he was one of the commissioners to settle the southern boundary between the United States and Spanish territory. Later in life he was professor of mathematics at West Point, He was an active member of the American philosophical society, and a frequent contributor to the *Transactions* of that body.

ELLICOTT, CHARLES JOHN, D.D., b. 1819; bishop of Gloucester and Bristol. He graduated at Cambridge in 1841, and was ten years rector of Pilton, Rutlandshire, but in 1858 became professor of divinity in King's college, London, and in 1860, Hulsean professor of divinity at Cambridge. In 1861, he was made dean of Exeter, and in 1863 bishop. He is the author of a *Treatise on Analytical Statics; The History and Obligation of the Sabbath; Lectures on the Life of our Lord Jesus Christ;* and *Considerations on the Revision of the English Version of the New Testament;* but his most important works are *Commentaries* of a number of the New Testament Epistles, eminent for thoroughness of grammatical criticism.

ELLICOTT CITY, the chief t. of Howard co., Md., on the Patapsco river and the Baltimore and Ohio railroad, 12 m. w.s.w. of Baltimore; pop. 1722. The soil is excellent; water power is abundant, and many flour mills and other manufacturing establishments are in operation. There are two Roman Catholic colleges in the place.

ELLIOT, EBENEZER, the CORN-LAW RHYMER, was b. at Masborough, in Yorkshire, Mar. 7, 1781. His father was a man of strong character and narrow opinions, and, as appears from Ebenezer's autobiography (published in the *Athenæum* in 1850), exercised no little influence on his son's modes of thinking and sympathies. When a boy at school, E. was not a quick pupil; and even after his father had sent him to work in the iron-foundry, where he himself held the situation of a clerk, the youth exhibited no fondness for reading. Before long, however, he entirely changed, and commenced to study Milton, Shakespeare, Ossian, Junius, and other authors. His first published poem was composed in his 17th year; it is entitled *The Vernal Walk.* This was succeeded by *Night; Wharncliffe;* etc. In 1821, E. began business as an iron-founder on his own account at Sheffield. He was very successful; and in 1841 retired to an estate which he had purchased at Great Houghton, near Barnesley, where he died 1st Dec., 1849. E.'s principal productions are *Love,* accompanied with a letter to lord Byron; his famous *Corn-law Rhymes; The Ranter;* and *The Village Patriarch,* a work full of noble and earnest poetry, all of which appeared between 1823–30. In 1834, he issued a collected edition of his works, in 3 vols.; and in 1840, an edition in one volume. E. followed Crabbe, but with more depth and fire of feeling, in depicting the condition of the poor as miserable and oppressed, tracing most of the evils he deplores to the social and political institutions of the country. The laws relating to the importation of corn were denounced by E. as specially oppressive, and he inveighed against them with a fervor of manner and a harshness of phraseology which ordinary minds feel as repulsive, even while acknowledged as flowing from the offended benevolence of the poet. But the glow of earnestness kindles his verse, and hides a multitude of faults. More enduring, however, than his rhyming philippics, are his descriptions of English, and especially of Yorkshire scenery, and his delineations of humble virtue and affection. These are instinct with the purest spirit of poetry.

ELLIOTT, a co. in n.e. Kentucky, drained by the head-waters of the Little Sandy river; pop. '70, 4,433—22 colored. It is hilly, with much forest land. Productions, wheat, corn, etc. Iron ore and coal are found. Co. seat, Sandy Hook.

ELLIOTT, CHARLES, D.D., LL.D.; 1792–1869; b. Ireland, where he joined the Wesleyan Methodists, and prepared for the ministry. At the age of 23, he came to America, and in 1818 joined the Ohio conference; in 1822, he was superintendent of missions among the Wyandot Indians; afterwards for five years presiding elder of the Ohio district; then for four years professor of languages in Madison college (Uniontown, Penn.). He was a few years later presiding elder of the Pittsburg district, editor of the *Pittsburg Conference Journal,* and subsequently of the *Western Christian Advocate* (Cincinnati). In 1857, he became professor of Biblical literature and president of the Iowa Wesleyan university. About 1860, he became editor of the *Central Christian Advocate* at St. Louis. Among his works are *Treatise on Baptism; Delineation of Roman Catholicism; History of the Great Secession from the Methodist Episcopal Church; Political Romanism; Reminiscences of the Wyandot Mission; South-western Methodism;* works against slavery, biographies, etc.

ELLIOTT, CHARLES LORING, 1812–68; b. New York, the son of an architect. Having an inclination for painting, he became a pupil of Trumbull, and afterwards of Quidor. He was for some time in New York city, where his efforts began to attract attention. After working chiefly on portraits for several years in the w. part of the state, he returned to the city, where he soon became the chief of portrait painters, having at his easel many hundreds of the most eminent citizens.

ELLIOTT, CHARLES WYLLYS, b. Conn., 1817; a descendant of the "apostle to the Indians." He began business as a merchant in New York, took up the study of horticulture and landscape gardening with A. J. Downing, and practiced the business in

Cincinnati. Returning to New York, he became one of the founders of the "Children's Aid Society," and was chosen a commissioner to lay out the Central park. Among his works are: *Cottages and Cottage Life; Mysteries—or Glimpses of the Supernatural; San Domingo—Its Revolution, and its Hero, Toussaint L'Ouverture; New England History from the Discovery of the Continent by the Northmen in* 986 *to* 1776; *Remarkable Characters and Places in the Holy Land*, etc.

ELLIOTT, JESSE DUNCAN, 1782–1845; b. Philadelphia; midshipman in the U. S. navy in 1804, rising to capt. in 1818. He was in the *Essex* in the war with Tripoli, and on the lakes under Perry and Chauncey in the war of 1812, where he commanded a boat expedition which captured two English brigs. In Perry's great victory, Elliott commanded the *Niagara*. He succeeded Perry in command on the lakes; in 1815, he was in the Mediterranean squadron; was commissioner to select sites for dockyards, light-houses, and fortifications on the North Carolina coast; and later, commanded the *Constitution* in the Mediterranean. His conduct did not meet with approbation, and he was tried by court-martial and suspended for four years. A portion of the sentence was remitted, and he was made commandant of the Philadelphia navy-yard in 1844.

ELLIOTT, STEPHEN, LL.D., 1771–1830; b. S. C.; a botanist; graduate of Yale. He was instrumental in establishing the literary and philosophical societies of South Carolina, and was their president. He also assisted in establishing the state medical college, of which he was one of the faculty. He published *The Botany of South Carolina and Georgia*. He was for a time the editor of *The Southern Review*

ELLIOTT, STEPHEN, D.D., 1805–66; son of the botanist; b. S. C.; graduate of Harvard; a lawyer until 1833; ordained in the Protestant Episcopal church, 1838. Soon afterwards he was appointed professor of sacred literature in South Carolina college. In 1840, he was chosen Protestant Episcopal bishop of Georgia.

ELLIOTT, WILLIAM, 1788–1863; b. S. C.; studied at Harvard; was in both branches of the legislature of his state, and in 1832 resigned rather than support nullification. He published *Fiesco*, a tragedy; *Carolina Sports by Land and Water;* and many political letters and essays.

ELLIPSE' is the name of a figure in geometry, important from its being the approximate shape of the planetary orbits. It is a curve of the second order, and is a conic section, formed by cutting a right cone by a plane passing obliquely through its opposite sides. It may be defined as a curve, the sum of the distances of every point in which from two fixed points within the curve is always the same. These two fixed points are called the foci; and the diameter drawn through them is the major axis; the minor axis bisects the major at right angles. The distance of either focus from the middle of the major axis is the *eccentricity*. The less the eccentricity is compared with the axis, the nearer the figure approaches to a circle; and a circle may be considered as an E. whose foci coincide.

There are various contrivances for describing an E., called ellipsagraphs or *elliptic compasses*. The simplest method of description is to fix on a plane the two ends of a thread with pins in the foci, and make a pencil move on the plane, keeping the thread constantly stretched. The end of the pencil will trace an E., whose major axis is equal to the length of the thread.

The equation to an E. (see CO-ORDINATES), referred to its center as origin, and to its major and minor axes as rectangular axes, is $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, where a and b are the semi-major and semi-minor axes respectively. From this equation, it may be shown, by the integral calculus, that the area of an E. is equal to πab; or is got by multiplying the product of the semi-major and semi-minor axis by 3.1416. It may also be shown that the length of the circumference of an E. is got by multiplying the major axis by the quantity $\pi\left(1-\frac{d^2}{2^2}-\frac{3d^2}{2^4.4^2}-\frac{3^2.5d^2}{2^6.4^2.5^2}-\text{etc.}\right)$, where $d=\frac{1-4b^2}{4a^2}$.

ELLIP'SIS (Gr. omission) is a term used in grammar and rhetoric, to signify the omission of a word necessary to complete the expression or sentence in its usual form. The object of E. is shortness and impressiveness; accordingly, it prevails in proverbs. Ellipses are used in all languages, but the same forms of ellipses are not common to all. Thus, "the house we saw," instead of "the house *that* we saw," is a kind of E. peculiar, so far as we know, to English.

ELLIP'SOID is a surface of the second order, of which the spheroid (q.v.) is a species, and the most interesting, from the fact of the form of the earth being spheroidal. The equation to an E. referred to its center and rectangular co-ordinates is $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$.

ELLIPTI'CITY (of the earth). See EARTH.

ELLIS, a co. in w. Kansas, drained by Saline and Smoky rivers, and crossed by the Kansas Pacific railroad; 900 sq.m.; pop. '78, 2,437. It is mostly prairie, and the soil is fertile. Co. seat, Hays City.

ELLIS, a co. in n.e. Texas, on Trinity river, intersected by the Houston and Texas Central railroad; 1100 sq.m.; pop. '70, 7,514—1506 colored. The surface is undulating, with plenty of timber; soil fertile, producing corn, cotton, wheat, etc. Co. seat, Waxahatchie.

ELLIS, ALEXANDER JOHN, F.R.S., F.S.A., was b. at Hoxton in 1814, and educated at Shrewsbury, Eton, and Trinity college, Cambridge, taking his B.A. degree in 1837. His name by birth was Sharpe, which was changed by royal license in 1825. He was elected a fellow of the royal society in 1864, and of the society of antiquaries in 1870. He was president of the philological society during 1872–74, and is a member of the philosophical and mathematical societies of London. Among his numerous and valuable works may be noted: *Alphabet of Nature* (1845); *Essentials of Phonetics* (1848); *Universal Writing and Printing* (1856); *Early English Pronunciation* (1869–71); *Practical Hints on the Quantitative Pronunciation of Latin* (1874); translation of Helmholtz's *Sensations of Tones as a Physiological Basis for the Theory of Music* (1875).

ELLIS, GEORGE EDWARD, D.D.; b. Boston, 1814; graduate of Harvard and of Cambridge divinity school; in 1840, Unitarian pastor in Charlestown, Mass.; resigning in 1869; in 1857, professor of doctrinal theology in the Cambridge divinity school. In 1864, he delivered the Lowell lectures in the evidences of Christianity. He wrote lives of John Mason, Anne Hutchinson, and William Penn, for Spark's *American Biography;* and published the *Half Century of the Unitarian Controversy; The Aims and Purposes of the Founders of Massachusetts;* and various memoirs and biographies. For several years he was editor of the *Christian Examiner*.

ELLIS, WILLIAM, an eminent English missionary, was b. in the year 1795. In Jan., 1816, he sailed with his wife for the South Sea islands, as a missionary of the London missionary society, and labored there for nearly ten years. He set up in Tahiti the first printing-press in the South Sea islands. In 1824, he returned to England, on account of the illness of his wife. He was for some years employed at home in the business of the London missionary society. In 1826, he published a *Narrative of a Tour through Owhyhee;* and in 1829, *Polynesian Researches,* 2 vols. In 1839, he published a *History of Madagascar,* 2 vols., compiled from government papers, and information received from missionaries. In 1835, his wife died, and two years afterwards he married Miss Sarah Stickney, who for many years conducted a school for girls at Hoddesdon, in Hertfordshire, and who is well known as the authoress of many popular works, among which are *The Women of England* (1838), *The Daughters of England* (1842), *The Wives of England* (1843), *Hearts and Homes* (1848–49), and *The Mothers of Great Men* (1859). Her works are all of an excellent moral and religious tendency, and have been very widely circulated both in Britain and America. She was educated among the Society of Friends, to which her parents belonged.—In 1853, Mr. E. was sent to Madagascar by the London missionary society, to inquire into the state of things in that island, and particularly into the condition and prospects of the Christians there. In 1859, he published an interesting and valuable work, entitled *Three Visits to Madagascar, during* 1853–56, *with Notices of the People, Natural History,* etc., a work to which we are largely indebted for our present information concerning that island. In his *Polynesian Researches,* as well as in this work, Mr. E. gives much information concerning the inhabitants, scenery, and productions of the countries which he visited, and few works of greater general interest or higher value have come from the pens of modern missionaries. In 1867, he published another work, the nature of which appears from its title, *Madagascar Revisited, describing the Events of a New Reign, and the Revolution which followed, setting forth also the Persecutions endured by the Christians, and their Heroic Sufferings, with Notices of the Present State and Prospects of the People.* He died in 1872.

ELLIS, WILLIAM, an English missionary and author. He was a poor boy with a scanty education, but bright and intelligent. When 20 years old, having come under deep religious impressions, he offered himself as a missionary to the London missionary society, and after spending a year in studying theology and acquiring several practical arts, such as printing and book-binding, he was sent to the South Sea islands in 1816, and reached his destination a year later. Here his labors were exceedingly fruitful, contributing much toward the great and beneficent changes that have taken place during the present century in that portion of the world. At the end of seven years he was compelled by the illness of his wife to return to England. The homeward voyage was made by way of the United States, where he spent several months in traveling and addressing missionary meetings, doing much thereby to arouse a missionary spirit in the American churches. On his arrival in his native land, he was appointed traveling agent of the London missionary society, whose principles and purposes he advocated in nearly every important town in Great Britain. While thus employed he published his *Tour through Hawaii,* which he had written while on the journey home; and also his *Polynesian Researches,* in two volumes, a work of much interest and value. In 1832, he was appointed foreign secretary of the society which he had so long served in other capacities, discharging the duties of the office with zeal and efficiency for seven years till ill-health compelled his resignation. During this period he had married his second wife, Miss Sarah Stickney, the well-known author, and published his *History of Madagascar.* After resting for a time in France, he took up his residence at Hoddesdon, Hertford-

shire, where, in 1847, he became pastor of a small Congregational church. At length he was called by the London missionary society to visit Madagascar, to promote the resumption of the missionary enterprise there. The results of this agency are set forth in his *Three Visits to Madagascar;* one of the most romantic narratives in the whole literature of missions. He made a fourth visit to the island in 1863, of which an account will be found in his *Madagascar Revisited.* He also wrote and published *A Vindication of the South Sea Missions from the Misrepresentation of Otto von Kotzebue;* and *Village Lectures on Popery.*

ELLISTON, ROBERT WILLIAM, 1774–1831; b. London; appeared as an actor at Bath when 17 years old; and in London at 22, where he rose to a leading position. He was lessee of Drury Lane in 1819; afterwards of the Surrey theater. Elliston was considered the best comedian of his time.

ELLO'RA, a decayed t. in the dominions of the Nizam, not far from the city of Dowlatabad, in lat. 20° 2′ n., and long. 75° 13′ east. It is celebrated for its wonderful rock-cut temples. Their number has not been precisely ascertained, but Erskine reckoned 19 large ones, partly of Hindu and partly of Buddhist origin. Some are cave-temples proper—i.e., chambers cut out in the interior of the rock—but others are vast buildings hewn out of the solid granite of the hills, having an exterior as well as an interior architecture, and being, in fact, magnificent monoliths. In executing the latter, the process was, first to sink a great quadrangular trench or pit, leaving the central mass standing; and then to hew and excavate this mass into a temple. The most beautiful of these objects is the Hindu temple, Kailasa. At its entrance, the traveler passes into an antechamber 138 ft. wide by 88 deep, adorned by numerous rows of pillars. Thence he proceeds along a colonnade over a bridge into a great rectangular court, which is 247 ft. in length and 150 broad, in the center of which stands the temple itself, a vast mass of rock richly hewn and carved. It is supported by four rows of pilasters, with colossal elephants beneath, and seems suspended in the air. The interior is about 103 ft. long, 56 broad, and 17 high, but the entire exterior forms a pyramid 100 ft. high, and is overlaid with sculpture. In the great court are numerous ponds, obelisks, colonnades, sphinxes, and on the walls thousands of mythological figures of all kinds, from 10 to 12 ft. in height. Of the other temples, those of Indra and Dumarheyna are little inferior to that of Kailasa. Regarding their antiquity and religious significance, authorities are not agreed; but at all events they must be subsequent to the epic poems *Ramayana* or *Mahabharata,* because they contain representations taken from these poems, and also to the cave-temples at Elephanta, because they exhibit a richer and more advanced style of architecture.

ELLORE, a t. of the district of Godavari, in the province of Madras, stands in lat. 16° 42′ n., and long. 81° 10′ east. According to the census of 1871, the pop. of E. was 25,487. E. was formerly an important military station, and has at present carpet manufactures. The town occupies both banks of the Jummulair, a torrent of the eastern Ghauts, which, instead of reaching the bay of Bengal, loses itself 3 m. further down, in the landlocked Colair lake. In fact, for about 50 m. to the westward of the sea, the neighboring country is depressed below the level of the maritime belt, the stagnant pool above mentioned not only having independent feeders of its own, but also receiving supplies, in the season of high-water, from the Kistnah or Krishna, and the Godavery. Under such circumstances, the climate of E. is at once unpleasant and unhealthy. During the s.w. monsoon, bringing with it, of course, the accumulated heats of the whole breadth of the peninsula, the temperature is more particularly oppressive, having been known to rise, in the night, to 120° F.

ELLSWORTH, a co. in central Kansas, on Smoky river, crossed by the Kansas Pacific railroad; 720 sq.m.; pop. '78, 5,057. The surface is nearly all prairie, and the soil fertile, producing corn, wheat, etc. Co. seat, Ellsworth.

ELLS'WORTH, a small but flourishing t. of North America, in the state of Maine, on both sides of the navigable river Union, 30 m. s.e. of Bangor, and about 4 m. w. of Frenchman's bay. It exports 50,000,000 ft. of timber annually, carries on cod and mackerel fisheries, and had, in 1870, 5,275 inhabitants.

ELLSWORTH, a port of entry, city, and seat of justice of Hancock co., Me., on Union river near the sea, 28 m. s.e. of Bangor; pop. '70, 5,257. The chief occupations are lumbering, navigation, and fishing.

ELLSWORTH, EPHRAIM ELMER, b. N. Y., 1837; killed May 24, 1861, at Alexandria, Va. Before the rebellion he organized a company of zouaves, with which he traveled in different parts of the country, in the summer of 1860, winning great praise by the perfection of their drill. In April, 1861, he organized a zouave regiment from the volunteer firemen of New York city. His regiment took part in the first advance of the national forces from Washington into Virginia. Ellsworth, as they entered Alexandria, went into a hotel to take down a secession flag which was flying from its roof, and while coming out with it was met and shot dead by the landlord, who the next moment was also dead—killed by Ellsworth's soldiers.

ELLSWORTH, OLIVER, LL.D., 1745–1807; b. Conn.; graduated at the college of New Jersey in 1766, and began the practice of law at Hartford. He was a member of

the Connecticut general assembly, and in 1777, a delegate to Congress. From 1780 to 1784, he was a member of the council of Connecticut, and in the latter year was appointed judge of the superior court. In 1787, he was sent as a delegate to the convention which framed the first constitution of the United States. He was one of the first U. S. senators from Connecticut, and at the end of his term was nominated by Washington chief-justice of the U. S. supreme court. After five years' service he resigned; but in the mean time he was sent to France as one of the commissioners to negotiate a treaty with that nation. Returning to Connecticut, he was chosen chief-justice of the supreme court, but declined to accept the place.

ELLSWORTH, WILLIAM WOLCOTT, LL.D.; 1791–1868; son of Oliver; b. Conn.; graduate of Yale, and professor of law in Trinity college. He was judge of the supreme court of the state from 1847 to 1861, a member of congress in 1829, and governor of Connecticut in 1838.

ELL'WANGEN, a t. in Würtemberg, 55 m. n.e. of Stuttgart; a place of considerable importance in manufacturing; pop. '70, 4,155. It is the seat of government of the circle of Jaxt.

ELLWOOD, THOMAS, 1639–1713; an English author noted for his intimacy with Milton, whom he met through an introduction by a Quaker family, and to whom he became reader of Latin. Ellwood had become a Quaker, to his father's great disgust, and with the result of bringing upon himself much persecution. Milton gave Ellwood the manuscript of *Paradise Lost* to read, and asked his opinion of it. In returning it, Ellwood suggested *Paradise Found* as a subject; and this, as Milton long afterward said, suggested to his mind the supplementary poem of *Paradise Regained*. It may be the general opinion that it would have been as well for the great poet if Ellwood had kept his idea to himself. Ellwood was the author of a number of polemical works, among them *Forgery no Christianity; The Foundation of Tithes Shaken;* and *Sacred Histories of the Old and New Testaments*.

ELM, *Ulmus*, a genus of trees of the natural order *ulmaceæ*, natives of temperate climates, with serrated leaves unequal in their two sides, and small flowers growing in clusters appearing before the leaves, and containing 4 to 12 stamens and one germen. The fruit is a samara, or compressed one-seeded little nut, winged all around. One of the most important species is the COMMON SMALL-LEAVED or ENGLISH ELM (*U. campestris*), a tree of 60 to 80 ft. in height, with ovato-elliptic, doubly serrated leaves, and flowers almost destitute of stalks. The wood is compact, and very durable in water. The tree is diffused all over Europe; is found also in the w. of Asia and n. of Africa, and is used for a great variety of purposes by wheelwrights, machine-makers, ship and boat builders, etc.; it is also prized by joiners for its fine grain, and the mahogany color which it readily assumes on the application of an acid. It is reckoned superior to the wood of any other species of elm. The bark is used in dyeing and in sugar-refining, and, in times of scarcity, has been used in Norway for grinding into meal and mixing in bread, which has a less disagreeable taste than that made from meal mixed with fir-bark. The inner bark is used medicinally in cutaneous diseases; it is mucilaginous, and has a bitter astringent taste. The ELM BALSAM (*beaume d'orme*,) which was formerly in great repute, is a brownish substance, which is found in dried galls of the leaves in the s. of Europe, Persia, etc. From these galls, in an earlier stage, flows a clear, viscid, sweetish liquid, called elm water (*eau d'orme*), which is used for washing wounds, contusions, and sore eyes.—The seeds of the E. are eagerly eaten by pigeons and common poultry. The E. is one of the principal timber trees of Britain, most extensively planted, and a chief ornament of English scenery.—The CORK-BARKED ELM (*U. suberosa*), by many regarded as a variety of *U. compestris*, is distinguished by the corky wings of the bark of the branches. It is a taller and more spreading tree, with much larger leaves. It is a European tree, common in plantations in Britain, but a doubtful native.—The DUTCH CORK-BARKED ELM (*U. major*) is also looked upon by many as a variety of *U. campestris*. It is still more corky in its bark, and has still larger leaves. It is of very quick growth, but the wood is very inferior.—The BROAD-LEAVED or WYCH ELM (*U. montana*) is the only species that can with certainty be regarded as indigenous to Scotland. It has rough and broad leaves, a stem less upright than the English E., and large spreading branches. The wood is used for all the purposes of the English elm. The tree is of very quick growth. Protuberances of gnarled wood are not unfrequently produced, which are finely knotted and richly veined; they are much esteemed for veneering, and are sometimes very valuable. Varieties of this species are known as the GIANT ELM and CHICHESTER ELM.—The SMOOTH-LEAVED ELM (*U. glabra*) is by some regarded as a variety of *U. montana*, but is distinguished, besides other characters, by smooth leaves, which are much smaller. It is a native of England. A variety called the HUNTINGDON ELM is much esteemed.—The CORNISH ELM (*U. stricta*), found in the s.w. of England, is remarkable for its rigid, erect, and compact branches.—Very different is the habit of *U. effusa*, a continental species with a large spreading head and smooth bark, distinguished also by the long stalks of its flowers and its ciliated fruit.—The AMERICAN or WHITE ELM (*U. Americana*), which abounds in the basin of the Mississippi, and attains its loftiest stature between lat. 42° and lat. 46°, is a magnificent tree, sometimes 100 ft. in height the trunk reaching 60 or

70 ft. before it separates into branches, and the widely diffused pendulous branches floating gracefully in the air; but the timber is not much esteemed.—The RED or SLIPPERY ELM (*U. fulva*) is also common in the basin of the Mississippi as far s. as lat. 31°, and in the western parts of Canada. It attains a height of 50 or 60 feet. The wood is more valuable than that of the last species, but much inferior to the English elm. The leaves and bark yield an abundant mucilage, which is bland and demulcent, and esteemed a valuable remedy in catarrh, dysentery, and other complaints.—The WAHOO or WINGED ELM (*U. alata*) is a small tree, found from lat. 37° to Florida, Louisiana, and Arkansas, remarkable for the branches being furnished on two opposite sides with wings of cork. The wood is fine-grained, compact, and heavy.—*U. Chinensis* is a Chinese species of E., the leaves of which often bear galls used by the Chinese in tanning and dyeing.

The name SPANISH ELM is given in the West Indies to a tree also called BOIS DE CHYPRE, *cordia gerascanthus*, of the natural order *cordiaceæ*, the timber of which is valuable; also to *hamelia ventricosa*, of the natural order *rubiaceæ*, the timber of which is known to cabinet-makers as prince-wood.

ELMI'NA, a fortified t. and seaport of West Africa, formerly capital of the Dutch settlements on the Gold coast, is situated in an undulating and thickly wooded district, in lat. 5° 10′ n., and long. about 1° 40′ west. It is a large, irregularly built town; and seems to be destitute of any noteworthy architectural features. The inhabitants consist chiefly of traders, fishermen, and artisans. A few miles to the e. is cape Coast Castle. E. was established by the Portuguese in 1481, and was the first Eropean settluement on the coast of Guinea. It was taken by the Dutch in 1637, and four years after, was ceded to them by Portugal. It was ceded to the British in 1872, and destroyed by them in 1874, during the Ashantee war. Pop. 12,000 to 15,000.

ELMI'RA, a t. of New York state, contains, according to the census of '75, 20,538 inhabitants. In point of situation, it possesses both natural and artificial advantages. It stands on the Chemung, a navigable feeder of the Susquehanna; it it connected by canals with Seneca lake and the interior of Pennsylvania, and by the Erie and Northern Central railways with New York, Philadelphia, etc. It possesses important iron and steel works, flour mills, breweries, tanneries, etc. E. is 273 m. distant from the capital of the state.

ELMIRA, (*ante*), a city and seat of justice of Chemung co., N. Y., on the Chemung river and canal, and the Erie, the Northern Central, the Tioga and Elmira State Line, and the Utica, Ithaca, and Elmira railroads; pop. '75, 20,436. In the city are a college for women, a free academy, a Roman Catholic academy, the New York state reformatory institution, and a large number of manufactories of railroad machinery, farming implements, tools, etc. It has a beautiful park of 300 acres, street railways, and water works. Its growth has been both rapid and substantial. The region around it is very fertile, and the city has an extensive trade. In the war of the rebellion it was made a great recruiting station, and was also the site of a military prison. The place was settled in 1790 and chartered as a city in 1864.

ELMORE, a co. in central Alabama, intersected by the Coosa and bounded by the Tallapoosa river, and crossed by the Eufaula and Montgomery railroads; 775 sq.m.; pop. '70, 14,477—6,730 colored. The surface is undulating, and the soil fertile; the productions are wheat, corn, and cotton. Co. seat, Wetumpka.

EL'MO'S FIRE, ST., is the popular name of an appearance sometimes seen, especially in southern climates during thunder-storms, of a brush or star of light at the tops of masts, spires, or other pointed objects. It is sometimes accompanied by a hissing noise, and is evidently of the same nature as the light caused by electricity streaming off from points connected with an electrical machine. See ELECTRICITY. The phenomenon, as seen at sea, was woven by the Greeks into the myth of Castor and Pollux; and even yet such lights at the mast-head are considered by sailors a sign that they have nothing to fear from the storm.

ELMSHORN, a t. in the Prussian province of Schleswig-Holstein, 20 m. n.w. of Hamburg, is situated on both banks of the Krückau, a navigable stream, and feeder of the Elbe. It is well-built, has considerable manufactures and an active trade in grain; it has also a boat-building yard and some tanneries. Vast numbers of boots and shoes are made at E., and are sold at all the fairs in the country round about. Many Jews reside here, as this was one of the few places in Schleswig or Holstein in which they were allowed to settle without having previously obtained permission. E. has an important annual cattle-market. Pop. '75, 5,183.

EL OBEID. See IL OBEID, or EL OBEID.

ELOCU'TION (Lat. for speaking out), the art of effective speaking, more espccially of public speaking. It regards solely the utterance or delivery; while the wider art of oratory, of which E. is a branch, takes account also of the matter spoken. The art of E. held a prominent place in ancient education, but has been greatly neglected in modern times. See READING AND SPEAKING.

ÉLOGE. When a member of the French *académie* dies, it is customary for his successor to deliver an oration, setting forth his merits and services. This is called an *éloge* (Lat. *elogium*, Gr. *eulogia*, praise), and a considerable branch of French literature goes by the name. Many of the French éloges are mere florid panegyrics; but others, particularly those written by Thomas, D'Alembert, Bailly, Condorcet, Cuvier, and other eminent savants, are interesting and valuable biographies. The proper epoch of the éloge began with Fontenelle (2 vols., Par. 1731), who was distinguished for clearness, ease, and elegance. His successors have tried to outshine him in pomp of language.

ELOHIM, Hebr., plural of *Eloâh*, Arab. *Ilâh*, Chald. *Elâh*, Syr. *Alôh*, might, power; in plur., intensified, collective, highest power—great beings, kings, angels, gods, *Deity*. As a *pluralis excellentiæ* or *majestatis*, and joined to the singular verb, it denotes, with very rare exceptions, *the One*, true God. Joined to the plural verb, however, it usually means gods in general, whether including the One or not. It is mostly used (in the singular sense) for or together with Jehovah (the Everlasting One); but some portions of the Scriptures employ exclusively either the one term or the other. This circumstance has given rise to endless discussions, and has also suggested amongst others the notion of different authors of Genesis. On this, and on the relation of those two words to each other, see the article JEHOVAH. We shall only mention here the hitherto unnoticed opinion of the Talmudists, that E. denotes the Almighty under the aspect of a God of strict justice; Jehovah, of clemency and mercy. As important for the history of the word E., we may add, in conclusion, that it was very probably Petrus Lombardus who first tried to prove the Trinity out of this plural form—an attempt which, although unanimously and scornfully rejected by all scholars, from Calvin, Mercerus, Calixtus, the younger Buxtorf, etc., to our times, has lately been revived by Rudolf Stier, who has gone so far as to invent a new grammatical term, "*Pluralis Trinitatis*," for this purpose. See also the articles SHEMITIC PLURAL and PENTATEUCH.

ELONGA'TION, ANGLE OF, is the angle measuring the distance between two stars, as seen from the earth. Usually, it is employed only in speaking of the distance of planets from the sun; the word "distance" being used instead of the word E., in regard to fixed stars and planets, as related to one another.

ELOPEMENT. See ADULTERY.

ELOQUENCE is the oral or written expression of thoughts and truths in a manner adapted to convince or persuade hearers or readers, and excite them to corresponding action. In its highest form it is inspired by an earnest love of truth and right, and a hearty scorn for whatever is base and false. An unrighteous cause may be defended with consummate skill, but not eloquently in the best sense of the word. The finest examples of eloquence—those which, through generations, have kept their place in the world's admiration, and which time can never destroy—are the utterances of men devoted to the truth and to the welfare of the human race. Emerson used to say that eloquence was "dog-cheap" in the antislavery meetings; if so, it must have been because those who spoke were inspired by a love of human freedom, and were conscious that they had a great and just cause. The great orators of antiquity were Demosthenes and Cicero. England in modern times has had her Pitt, Burke, Fox, and Sheridan, and now has her Gladstone and Bright. Ireland has a long line of men whose eloquence has moved the heart of nations, among them Grattan, Phillips, and O'Connell. In many of the European nations the growth of eloquence has been checked by causes originating in their political institutions and social habits. Among the names of great orators in France, that of Mirabeau is the most conspicuous. In the records of pulpit eloquence France presents among others the names of Bossuet, Massillon, Lacordaire, Lamennais, and Hyacinthe. The history of the United States is illustrated by eloquence at every step. James Otis, Fisher Ames, and Patrick Henry are names belonging to the period of the revolution. Since that day we have had Webster, Clay, Calhoun, Wirt, and Choate. In pulpit eloquence the country has been and is still rich. Among many eminent names in this department may be mentioned Samuel Davies, John Mason, Lyman Beecher, William Ellery Channing, Orville Dewey, Edwin H. Chapin, Henry Ward Beecher, Stephen H. Tyng, sr., and Richard S. Storrs.

EL PASO, a co. in central Colorado, on the head-waters of the Arkansas river, intersected by the Denver and Rio Grande railroad; 2,800 sq.m.; pop. '70, 987. The surface is rough and the soil fertile; productions chiefly agricultural. Pike's Peak, so long known as a guide-post for travelers over the plains, is one of its features. Co. seat, Colorado Springs.

EL PASO, the extreme w. co. of Texas, on the Rio Grande, and the New Mexico border; 9,450 sq.m.; pop. '70, 3,761—306 colored. Nearly the whole of the co. is sandy and barren, but there is some moderately good soil along the valley of the Rio Grande. Co. seat, El Paso.

EL PA'SO DEL NOR'TÉ (in English, *the Pass of the North*) is a narrow valley of 9 or 10 m. in length, near the north-eastern extremity of the republic of Mexico. It is situated within the state of Chihuahua (q.v.), in lat. 31° 42' n., and long. 106° 40' w., being on the right bank of the Rio Grande, or Rio Bravo del Norte, about 1420 m. from its mouth. It is remarkably fertile, yielding, in particular, considerable quantities of wine and brandy.

It contains about 5,000 inhabitants, nearly all of them of mixed blood. In fact, the people are little better than the aboriginal savages, being almost destitute of the most ordinary appliances of civilized life. The place is worthy of notice chiefly as the main thoroughfare between New Mexico and Mexico proper.

EL'PHIN, a bishop's see in Ireland, united to Kilmore in 1833.

ELPHINSTONE, The Honorable MOUNTSTUART, 1779–1859· an English statesman. He was sent when but 17 years old by the East India company to Calcutta, became assistant to the British resident at Poonah in 1801, and later to sir Arthur Wellesley, to whom he acted as aid on the outbreak of war, and after the war was appointed resident at Nagpore. In 1808, he was envoy to the Afghan capital, Cabul, and in 1811 resident at Poonah. On the renewal of hostilities in 1817, he assumed command of the English troops during the battle of Kirkee, and contributed largely to their success. He subsequently governed the conquered districts with remarkable force and considerateness, preserving the native customs and rights, so as to win the regard of his subjects, and strengthen British rule. In 1820–27, he was lieutenant-governor of Bombay, and drew up the Elphinstone code. He is regarded as the founder of state education in India. He was twice offered the governor-generalship of India, but declined. His last 30 years were devoted to study and authorship. He wrote *An Account of the Kingdom of Cabul and its Dependencies in Persia and India*, and a *History of India*. Both are standard authorities.

EL'PHINSTONE, WILLIAM, a celebrated Scottish prelate, and founder of King's college, Aberdeen, was b. in the year 1430 or 1431. He was the son of William Elphinstone, rector of Kirkmichael, and archdeacon of Teviotdale, and, as the marriage of ecclesiastics was then prohibited, his birth was illegitimate. E. studied at the university of Glasgow, where he took his degree of M.A. at the age of 24, at the same time that he took priest's orders. He seems to have acted as his father's curate at Kirkmichael for four years, but being strongly attached to the study of law (he had practiced as an advocate in the church courts before this), he went to France in his 29th year, at the instigation of his uncle, Laurence Elphinstone, who supplied him with the means of studying at the most celebrated schools of the continent. E. so highly distinguished himself, that after three years he was appointed professor in the university of Paris, and afterwards at Orleans, which had then the highest reputation as a legal school. So greatly were his learning and talents appreciated, that the parliament of Paris used to ask his opinion on great questions. After a residence of nine years abroad, he returned to Scotland, and was made successively official-gen. of the diocese of Glasgow (1471–72), rector of the university (1474), and official of Lothian in 1478, "then probably," says Mr. Cosmo Innes (*Sketches of Early Scottish History*, Edin. 1861), "the second judicial office in the kingdom, which he filled for two years, sitting in parliament, and serving on the judicial committees, which formed the supreme civil jurisdiction in Scotland." His dignity, learning, and prudence now began to procure him universal respect. He was the principal member of a great embassy sent from Scotland to France, to settle certain disputes that had sprung up between the two countries, and threatened the stability of their ancient alliance. In this important affair, he was eminently successful. On his return, he was made bishop of Ross in 1481. In 1483, he was removed to the see of Aberdeen; and between this period and the death of James III. he was several times engaged in embassies to France, England, Burgundy, and Austria. For a few months before the death of that monarch, he held the office of chancellor of the kingdom. He lost this great office on the accession of James IV., but, says the authority already quoted, "he was speedily restored to favor, and to the royal councils, and seems to have been keeper of the privy seal from 1500 till his death." He did not suffer his office to withdraw him from the care of his diocese, where he applied himself to the faithful discharge of his episcopal functions, endeavoring to reform the clergy, the service, and the ritual of his church. He next concluded (while on a mission to the continent for another purpose) a treaty with Holland, which was beneficial to Scotland. E. seems to have had a genuine desire for the enlightenment and improvement of his countrymen. Whenever leisure permitted, we find him engaged in devising means to this end. It appears to have been chiefly through his influence that the first printing-press —that of Chepman and Miller—was established in Scotland. He superintended the preparation and printing of the *Breviary of Aberdeen*, and collected the materials for the lives of the Scottish saints contained in that work. He procured from the pope (Alexander VI.) a bull for erecting a university in Aberdeen. The bull was sent in 1494, but the college was not founded till 1500, when it was dedicated to St. Mary—a name afterwards changed to King's college. E. built also the great central tower and wooden spire of his cathedral church at Aberdeen, provided its great bells, covered the roofs of its nave, aisles, and transept with lead; and, at his own expense, built a stone bridge over the Dee for the benefit of his townsmen. The fatal battle of Flodden, 9th Sept., 1513, broke the spirit of E., who was never seen to smile after. He died 25th Oct., 1514, and was buried before the high altar of the chapel of the college which he founded. E. was a man of great vigor of mind and nobleness of nature—"one of those prelates," says a writer in the *Quarterly Review* (No. clxix., p. 141), "who in their munificent acts, and their laborious and saintly lives, showed to the Scottish church, in her

corruption and decay, the glorious image of her youth." "We know him," says Mr. Innes, "in the history of the time as the zealous churchman, the learned lawyer, the wise statesman; one who never sacrificed his diocesan duties to mere secular cares, but knew how to make his political eminence serve the interests of his church; who, with manners and temperance in his own person, befitting the primitive ages of Christianity, threw around his cathedral and palace the taste and splendor that may adorn religion, who found time, amidst the cares of state and the pressure of daily duties, to preserve the Christian antiquities of his diocese, and collect the memories of those old servants of truth who had run a course similar to his own; to renovate his cathedral service, and to support and foster all good letters, while his economy of a slender revenue rendered it sufficient for the erection and support of sumptuous buildings and the endowment of a famous university." Some volumes of notes made by E. when studying in the law schools, are preserved in the library of the university of Aberdeen. A transcript of Fordun's *Scotichronicon*, with some additions, in the Bodleian library at Oxford, was long erroneously ascribed to him. His *Breviarium Aberdonense*, printed in 1509–10, was reprinted in two vols. 4to at London in 1853.

EL ROSARIO, a small t. of the Mexican confederation in the state of Cinaloa, is situated 55 m. e.n.e of Mazatlan. It is important chiefly as being a commercial entrepôt between Mazatlan and the interior. Pop. 5,000.

ELSASS AND ELSASS-LOTHRINGEN. See ALSACE, *ante*.

ELSINORE' (Dan. *Helsingör*), a t. and seaport of Denmark, on the island of Seeland, is situated on the western shore of the sound, and at its narrowest part, 3½ m. w.s.w. of the town of Helsingborg in Sweden, and 24 m. n. of Copenhagen. Lat. 56° 2′ n., long. 12° 36′ east. The town, which has been in recent times considerably improved, is spacious, and consists of one long principal street, with several lateral branches. The cathedral, containing some fine tombs, many of them very old, may be considered as one of the most interesting edifices. At a short distance to the e. of E. are the castle and the fortress of Kronborg, the former a white stone building in the Gothic style, and the latter, a stronghold mounted with guns that command the sound in all directions. To the n.w. of E., and in its immediate vicinity, is the royal château of Marienlist, the pleasure-grounds of which, occupying the crest of a hill, are open to the public. From the grounds of Marienlist, magnificent views may be had of the sound, of Helsingborg, and of the plains of Sweden. The harbor of E., formed by a wooden pier, is accessible to ships of light draught. E. has a brisk foreign trade, and has, besides, manufactures of straw-hats, arms, sugar, brandy, etc., also cotton-printing and fisheries. The sound dues (q.v.) were collected here. Pop. '70, 8,891.

Saxo Grammaticus, a famous writer of the 12th c., was born here. Here Shakespeare laid the scene of his *Hamlet*, a perversion of history on the part of the great dramatist, as Jutland, not Seeland, was Hamlet's country. The vaults under the castle of Kronborg were supposed to be the residence of Holger Danske, the mythic hero of Denmark, who never appeared above ground save when the country was in danger, and was then supposed to march at the head of the Danish armies. In severe winters the sound is frozen over at E., so that one can walk over the ice from Denmark to Sweden.

ELSSLER, FANNY, a celebrated dancer, was b. at Vienna in the year 1811, and educated at Naples for the ballet, along with her elder sister Theresa. The first triumph of the sisters took place at Berlin, where they appeared in 1830. The reputation acquired by Fanny in Berlin preceded her to France, America, England, and St. Petersburg, where her beauty, amiability, and mastery in her art, charmed all classes of society. In 1841, the two sisters went to America, where they excited unwonted enthusiasm. After Fanny had earned laurels in St. Petersburg, she returned, in 1851, to Vienna, to take a final leave of the stage. She then retired to Hamburg, where she remained, till in 1854 she settled finally in Vienna. Theresa was less graceful in her motions than her sister, but exhibited great strength, boldness, and agility. On the 25th April, 1851, she became the wife of prince Adalbert of Prussia (who died in 1873), and was ennobled by the king of Prussia.

ELSTER, the name of two rivers of Germany, the white and the black Elster. The white E. rises at the foot of the Elster mountains, on the n.w. boundary of Bohemia, flows in a northerly direction, and falls into the Saale 3 m. s. of the town of Halle, in Prussia. Its chief affluent is the Pleisse from the right. Total length, 165 miles. The black E. rises in the kingdom of Saxony, within 2 m. of Elstra, flows n.w., enters Prussia, and joins the Elbe 8 m. s.e. of Wittenberg. Length, 130 miles.

ELSTRACKE, REGINALD or RENOLD, an English engraver, who flourished about 1620. He worked chiefly for the booksellers, and his plates, which are executed with the graver, without etching, are almost entirely confined to portraits. Prints from his plates are much sought after, not only from their scarcity, and as illustrating English history, but as works of art, in which much character is expressed in a firm and forcible manner. When he did not sign his plates with his name, he marked them with his initials, R. E.

ELTON, a famous salt lake of Russia, is situated in the government of Saratov, 170 m. s.s.e. from the town of that name, the lat. of its center being 48° 56′ n., and the long. 46° 40′ east. Its longest diameter is 11 m., and its shortest about 9 miles. It has a superficial extent of 45,500 English acres, but at no place is it more than about 15 in. in depth. It is of an oval form, and can be easily reached from the s., but the northern bank rises so rapidly that access to it from that quarter is difficult. In the hottest season, so wonderful is the illusion produced by the crystallized salt, that the lake seems covered with snow and ice. E. yields about 100,000 tons of salt annually, in the collection of which about 10,000 persons are employed.

ELUTRIATION is the term applied to the process of separating, by means of water, the finer particles of earths and pigments from the heavier portions. The apparatus generally used is a large vat, in which grinding wheels revolve, and the substance to be reduced to powder being placed in the vat along with water, the wheels in revolving not only pulverize the material, but from their motion being communicated to the water, the latter is enabled to retain in mechanical suspension the finer particles of the clay, etc. By allowing a stream of water to flow in and out of the vat, the finer particles can be constantly floated away, and the liquid being run into settling vats, the fine powder settles to the bottom, when the water can be run off from the surface. This process is much employed in the manufacture of the materials used in pottery, and in the preparation of pigments.

ELUTRIATION (from a Latin word meaning "to cleanse"), an operation for preparing clay for porcelain manufacture, and for glazing earthenware, and for other purposes. Different forms of apparatus are used; some employ vats containing grinding wheels, others only wheels for stirring; but a simple deep vat or hogshead will answer the purpose on a small scale, the stirring being done by hand, with a rod or paddle. The earth or clay being mingled with sufficient water to make it quite thin, is stirred and allowed to stand, till the coarser particles are precipitated. The finer particles, suspended in the water, may then be drawn off (a siphon may be used with advantage), and after they have subsided, may be collected. The process for filtering water in reservoirs supplying cities by which it is made to pass over and under diaphragms, so that both light and heavy impurities are separated, is a process of filtration by elutriation. Elutriation on a grand scale is exhibited by nature in the deposit of fine earths. The immense beds of fine potter's clay and kaolin covering many square miles in area, are the result of the slow subsidence of fine particles suspended in water passing in a slow but steady current in estuaries. The streams from the land carry down the turbid products of rain, depositing at first coarse gravel, then finer gravel, then coarse and fine sand, all the particles pursuing an oblique descent, more and more approaching the horizontal, till at last the impalpable particles of fine clay are slowly deposited over vast areas.

EL'VANS are veins of a granular crystalline mixture of felspar and quartz, probably proceeding from a granite mass, which are found in granite rocks and fossiliferous slates in Cornwall, Devon, and the s. of Ireland.

EL'VAS, an episcopal city and fortress of Portugal, stands in a very fruitful district on the eastern frontier of the province of Alemtejo, 10 m. w. of Badajoz, and 40 m. n.e. of Evora. It is the strongest fortress in Portugal, and one of the strongest in Europe. It is built upon a precipitous hill; is surrounded by walls, and by a glacis and covered-way. Besides these, E. has other defenses in two formidable forts, fort Sta. Lucia, and fort Lippe, the former to the s., and the latter—almost entirely shell-proof—to the n. of the city. E. is an old town; many of its houses are badly built. Its most striking architectural feature is an enormous aqueduct, which conveys water to it from a distance of 3 miles. This aqueduct consists of four tiers of arches built upon one another, and rising to the height of about 250 feet. The chief manufactures of E. are arms and jewelry. There are here extensive store-houses filled with British manufactures, and the inhabitants, by illegally selling these goods within the Spanish frontier, realize considerable wealth. Pop. 18,510.

E. has undergone may sieges, but has never been taken. The Spaniards besieged it in 1385, and again in 1659, when a famous battle took place called the Lines of Elvas, in which the Portuguese, through greatly inferior in numbers, drove the Spaniards from their lines in front of the town. E. was raised to the rank of a city by D. Manoel, king of Portugal, in 1513.

ELVES. See FAIRIES.

E'LY, so called from a Saxon word, *elig*, an eel, or *helig*, a willow, may be called a cathedral town rather than a city, and is situated on an eminence in that part of the fen-country of Cambridgeshire called the *Isle of Ely*. Pop. '71, 8,166. The Eastern Counties and the Great Northern railways have each stations, the former outside, the latter in the town.

Ely Cathedral.—About the year 673, Etheldreda, daughter of the king of East Anglia, and wife of Oswy, king of Northumberland, founded a monastery here, and took on herself the government of it. Two hundred years afterwards (870), the Danes ravaged the Isle, and destroyed the monastery, which was rebuilt in 970 by St. Ethelwold, bishop

of Winchester; and this continued till 1081, when a new church was begun, which was converted into a cathedral, and the abbey erected into a see in 1109. The possessions of the abbey were divided between the bishop and the community. The cathedral contains some beautiful specimens of architecture, especially of early Norman. Its exterior dimensions are 535 ft. from w. to east. The great cross or main transept is 190 feet. The turrets of the w. tower are 215 ft. high, and the lantern over the central tower 170 feet. The w. front was built by Geoffry Ridel, the third bishop, who died in 1189, and is of Norman work. About 200 years after his time, an addition of 64 ft. was made to the tower, and over that a spire. This great superincumbent weight crushed the n.w. transept, and the s.w. one, which still remains, was considerably weakened. In front there is a w. portico or galilee (q.v.), of early Gothic, said to be the work of bishop Eustachius. The nave is of Norman work, and was completed about 1174. The columns are alternately round and octagonal. The roof was, in 1861, beautifully painted. The transepts, which are the most ancient parts of the church, were built in the reign of Henry I. They had originally a middle and two side aisles, but the latter are, in the s. transept, walled up, and the space used as a vestry and library. Originally there stood a square tower in the center of the building, opening into the nave and transepts; but this gave way in 1322, and fell eastwards, crushing three arches of the choir. The repair of this dilapidation was undertaken by the sacrist of that time, Alan de Walsingham. The design was original, an octagon tower with four longer and four shorter sides, surmounted by a lantern. The upper part of this, which is of timber, has recently been rebuilt.

The choir contains some rich varieties of decorated Gothic, and the fine shafts of Purbeck marble combine beautifully with the white stone-work. The whole has lately been restored and beautified. Originally, it was much shorter eastwards, and protruded into the nave, but in 1235 the semicircular end of the old church was taken down, and six arches added by Hugh de Northwold. At the dedication and removal of the relics, Henry III. and his court were present. The e. end is eminently beautiful: it consists of two tiers of high lancet-shaped windows. Perhaps the most interesting and yet beautiful part of the building is the Lady chapel—an incomparable work, irreparably spoiled by the barbarism of Puritan times. It was begun in 1321, and finished in 1349, simultaneously with the rebuilding of the central tower and ruined choir, a circumstance highly illustrative of the taste and munificence of the times. It has a stone roof, like King's college chapel in Cambridge, which it is supposed to have suggested, and the walls were once decorated from top to bottom with countless niches and images of saints and martyrs, not one of which remains undefaced. Its length is 100 ft.; width, 46; height, 60. Bishop Alcock's chapel, in which he lies buried, is at the e. end of the n. aisle—an overloaded specimen of the richest florid Gothic. Bishop West's chapel, at the e. end of the s. aisle, is a more pleasing example of the same style.

Amongst the celebrated names connected with E. are abbot Thurstan, who defended the isle against William the conqueror for seven years; Longchamp, chancellor and regent under Richard I.; chancellor Morton, Simon Patrick, and bishop Andrews. The bishops of E., like the bishops of Durham, formerly enjoyed a palatine jurisdiction, and appointed their own chief-justice, etc.; but this privilege was taken from them by the 6th and 7th Will. IV. The bishop of E. is visitor to St. Peter's, St. John's, and Jesus colleges, Cambridge, of which last he also appoints the master. There is a grammar-school attached to the cathedral, founded by Henry VIII. There are some interesting remains of the old conventual buildings in the neighborhood of the cathedral.

ELY, Isle of, the s. part of the Bedford Level, or the part of Cambridgeshire n. of the Ouse. It includes above a half of this county, is 24 m. long from n. to s., with an average breadth of 14 m., and contains four hundreds. It consists of a monotonous, marshy, or fenny plain, formerly covered with water, and abounding in aquatic birds and plants. It chiefly consists of black earth and turf, and, where well drained by innumerable artificial canals and ditches, it produces fine crops of hemp, flax, wheat, oats, and cole-seed. Over it are interspersed small eminences, generally crowned with villages and towns, as Ely City, March, Thorney, Whittlesea, and Wisbeach. Pop. about 60,000.

ELYMAIS, an ancient province on the Persian gulf, supposed to have been a district of Elam (q.v.), though the name is sometimes used as equivalent to Elam.

ELYRIA, the seat of justice of Loraine co., Ohio, on Black river, 7 m. s. of lake Erie, on the Lake Shore and Michigan Southern railroad, at the junction of the Sandusky and Norwalk divisions, and the crossing of the Lake Shore and Tuscarawas Valley railroads; pop. '70, 3,038. There is water-power furnished by Black river, and a number of important manufactories.

ELYSIUM (Gr. *elysion*), a place in the infernal regions of the ancient classical mythology, where the souls of the good dwell after death. In the *Odyssey*, Homer describes it as a place where the souls of the departed lived in ease and abundance among innocent pleasures, and enjoying a mild and wholesome air. In the *Iliad*, however, he gives a somber view of the state of the departed souls. Achilles, though in E., is made to envy the life of the meanest hind on earth. By succeeding poets, the bliss of E. is drawn

in much more lively colors. Besides the amenity and various delights of the place, diverse employments are found for the inhabitants, according to the ruling passion of each while on earth. E. was supposed by some writers to be in mid-air, by others in the sun, by others in the center of the earth, next Tartarus, by others in the Islands of the Blest.

ELZEVIER', or ELZEVIR, the name of a celebrated family of printers at Amsterdam, Leyden, and other places in Holland, whose beautiful editions were chiefly published between the years 1583 and 1680. Louis, the first of them, is said to have been born at Louvain about the year 1540. He was induced by religious disturbances to leave his native city, and in 1580, he settled as a bookbinder and bookseller in Leyden, where he died about 1617. The first work edited by him bears the title *Drusii Ebraicorum Quæstionum ac Responsionum Libri Duo, videlicet Secundus ac Tertius, in Academia Lugdunensi* MDLXXXIII. *Veneunt Lugduni Batavorum apud Elseuirium e Regione Scholæ Novæ.* The second, a Eutropius by P. Merula, bears the date 1592, and was long erroneously believed to be the first that issued from E.'s press. Five out of Louis' seven sons continued to carry on their father's business. Their names were Matthew, Louis, Aegidius, Jodocus (Joost), and Bonaventura. The last, in conjunction with his nephew Abraham E. (a son of Matthew), prepared the smaller editions of the classics, in 12mo and 16mo, which are still valued for their beauty and correctness. It is mainly on these that their reputation is based. The house of E., in Amsterdam, was established by Louis, the son of Jodocus E., in 1638. Peter E., grandson of the last mentioned, carried on the bookselling business in Utrecht, and died in 1696. For more than a century, however, this family has ceased to have any connection with book-printing. It is believed that 1213 works in all proceeded from the E. presses. Amongst the most beautiful are the editions of Pliny, Virgil, Livy, Tacitus, and Cæsar; and, though for Greek and Hebrew texts the house of E. was surpassed by that of Stephens (q.v.), their Latin classics are unrivaled both for beauty and correctness. It is said that the Elzeviers generally employed women to correct the press, under the conviction that they would be less likely than men, on their own responsibility, to introduce alterations into the text. Compare Adry, *Notice sur les Imprimeurs de la Famille des Elzeviers* (Paris, 1806), and Pieter's *Annales de l'Imprimerie Elsévirienne* (Ghent, 1851–52).

EMACIA'TION (Lat. *macies*), leanness. See CONSUMPTION, TABES DORSALIS.

EMANA'TION means, in general, efflux or issue. In theology and philosophy, it indicates an ancient doctrine, which considered all things as emanating or flowing from a supreme principle. According to this doctrine, the origin of things is only an overflowing of the divine fullness—an outstreaming of the light from the necessity of its nature, and not any free action on the part of God. What is thus given off as a copy from original perfection, departs more and more from its source, and gradually degenerates, which was thought to account for the origin of evil. This doctrine came from the east, and pervades the Indian mythology, the system of Zoroaster, and the Neo-Platonic philosophy of Alexandria. In Christian theology, the idea of E. has been applied to explain the relation among the persons of the Trinity.

EMANCHÉ. See MANCH.

EMANCIPA'TION. See SLAVERY.

EMANCIPATION, in the Roman law, was the act by which the *patria potestas* (q.v.), or paternal authority, was dissolved in the life-time of the father. It took place in the form of a sale (*mancipatio*) by the father or the son to a third party, who manumitted him. The Twelve Tables required that this ceremony should be gone through three times, and it was only after the third sale that the son became *sui juris* under his own law. In general, the son was at last resold to the father, who manumitted him, and thus acquired the rights of a patron (q.v.), which would otherwise have belonged to the alien purchaser who finally manumitted him. In the case of daughters and grandchildren, one sale was sufficient. If the child died intestate, or if he required a tutor or curator, the father's rights as patron came into play; but if the father died intestate, the son took nothing, because he was out of his family. But this rigor of the old law was modified by the prætor's edict, which placed all the children on the same footing. In the law of Scotland, E. is called forisfamiliation (q.v.). The only case in which the term is employed in England is with reference to poor-law settlements. See SETTLEMENT, POOR AND POOR-LAWS.

EMANCIPATION, CATHOLIC. See ROMAN CATHOLIC EMANCIPATION.

EMANCIPATION, PROCLAMATION OF. The document issued by Abraham Lincoln, president of the United States, Jan. 1, 1863, declaring the immediate freedom of the great majority of the slaves in the United States, and striking a death-blow at the whole system of American slavery in this country, for the purpose of putting an end to the rebellion then existing in the slave states and restoring the union on the basis of equal liberty for all men. For a long time president Lincoln hesitated, on constitutional grounds, to take this step, which he held to be within the power of the executive only as a measure of war. At length, however, a crisis arrived when he felt it to be not only a right but a duty to destroy the institution in which the rebellion had its roots, and

which had long been the great embarrassment and opprobrium of the republic. The document, in view of its purposes and effects, must ever hold an important place in the national annals.

PROCLAMATION.

Whereas, On the 22d day of Sept., in the year of our Lord 1862, a proclamation was issued by the president of the United States, containing among other things the following, to wit:

That, on 1st day of Jan., in the year of our Lord 1863, all persons held as slaves within any state, or any designated part of a state, the people whereof shall then be in rebellion against the United States, shall be thenceforward and forever free, and the executive government of the United States, including the military and naval authority thereof, will recognize and maintain the freedom of such persons, and will do no act or acts to repress such persons, or any of them, in any efforts they may make for their actual freedom:

That, the executive will, on the 1st day of Jan. aforesaid, by proclamation, designate the states and parts of states, if any, in which the people thereof respectively shall then be in rebellion against the United States, and the fact that any State, or the people thereof, shall on that day be in good faith represented in the congress of the United States by members chosen thereto at elections wherein a majority of the qualified voters of such state shall have participated, shall, in the absence of strong countervailing testimony, be deemed conclusive evidence that such state and the people thereof are not then in rebellion against the United States:

Now, therefore, I, Abraham Lincoln, president of the United States, by virtue of the power in me vested as commander-in-chief of the army and navy of the United States, in time of actual armed rebellion against the authority and government of the United States, and as a fit and necessary war-measure for repressing said rebellion, do, on this 1st day of Jan., in the year of our Lord 1863, and in accordance with my purpose so to do, publicly proclaim for the full period of 100 days from the day of the first above-mentioned order, and designate as the states and parts of states wherein the people thereof respectively are this day in rebellion against the United States, the following, to wit: Arkansas, Texas, Louisiana, except the parishes of St. Bernard, Plaquemines, Jefferson, St. John, St. Charles, St. James, Ascension, Assumption, Terre Bonne, Lafourche, St. Mary, St. Martin, and Orleans, including the city of New Orleans, Mississippi, Alabama, Florida, Georgia, South Carolina, North Carolina, and Virginia, except the 48 counties designated as West Virginia, and also the counties of Berkeley, Accomac, Northampton, Elizabeth City, York, Princess Ann, and Norfolk, including the cities of Norfolk and Portsmouth, and which excepted parts are, for the present, left precisely as if this proclamation were not issued.

And by virtue of the power and for the purpose aforesaid, I do order and declare that all persons held as slaves within said designated states and parts of states are, and henceforward shall be, free; and that the executive government of the United States, including the military and naval authorities thereof, will recognize and maintain the freedom of said persons,

And I hereby enjoin upon the people so declared to be free, to abstain from all violence, unless in necessary self-defense, and I recommend to them, that in all cases, when allowed, they labor faithfully for reasonable wages.

And I further declare and make known that such persons of suitable condition will be received into the armed service of the United States to garrison forts, positions, stations, and other places, and to man vessels of all sorts in said service.

And upon this, sincerely believed to be an act of justice, warranted by the constitution, upon military necessity, I invoke the considerate judgment of mankind and the gracious favor of Almighty God.

In witness whereof, I have hereunto set my hand and caused the seal of the United States to be affixed.

[L.S.] Done at the city of Washington, this 1st day of Jan., in the year of our Lord 1863, and of the independence of the United States of America the 87th.

By the president: ABRAHAM LINCOLN.

WILLIAM H. SEWARD, secretary of state.

The work of emancipation in the United States was completed at the adoption of article XIII. of the amendments to the constitution, and the reconstruction of the states in rebellion upon that basis. (See SLAVERY, *ante*).

EMANUEL, a co. in e. central Georgia, s.e. of Ogeechee river; 950 sq.m.; pop. '70, 6,134—1703 colored. The surface is level and largely covered with pine forests; soil sandy, and not very productive. Cotton, corn, and pork are produced. Co. seat, Swainsborough.

EMAN'ÜEL I., King of Portugal, styled THE GREAT, and sometimes, likewise, THE FORTUNATE, was b. on the 3d May, 1469, and succeeded John H. in 1495. Before his accession to the throne, he bore the title of duke of Beja. On his accession, he prepared the code of laws which bears his name, and rendered himself remarkable by his zeal and exertions in the cause of education, by his active piety, and by his predilection for the society of artists and scholars. Through his exertions, Portugal became the

first naval power of Europe, and the center of the commerce of the world. He despatched Vasco da Gama to sail round the cape of Good Hope, and discover the passage to India. Cabral was commissioned by him to prosecute the discoveries of Vasco da Gama still further, and Corte Real to sail along the coasts of North America. The expeditions under Albuquerque put E. in possession of the s. coast of Africa and of the Indian archipelago. Not satisfied with this, he opened a communication with Persia, Ethiopia, and, in 1517, with China. At his death, 13th Dec., 1521, Portugal was in possession of a large fleet, strong fortresses, well-furnished arsenals, a warlike army, a flourishing trade and commerce, and extensive colonies. His reign has been termed the golden age of Portugal. E. was thrice married: first to Isabella, the daughter of Ferdinand; afterwards to Mary of Castile, her sister (by whom he had two children, John and Isabella, the former of whom succeeded him on the throne); and thirdly, to Eleanore of Austria, sister of Charles V.

EMARGINATE. See LEAVES.

EMBA, a river of Turkistan, in the Kirghiz territory, rises at the western base of the Muchajar or Mongojar mountains, and flowing in a s.w. direction, enters the Caspian sea after a course of about 300 miles.

EMBALMING, the art of preserving the body after death, invented by the Egyptians, whose prepared bodies are known by the name of mummies, and are called in the hieroglyphs *sahu*, and by St. Augustine *gabbaroe*. This art seems to have derived its origin from the idea that the preservation of the body was necessary for the return of the soul to the human form after it had completed its cycle of existence of three or ten thousand years. Physical and sanitary reasons may also have induced the ancient Egyptians; and the legend of Osiris, whose body, destroyed by Typhon, was found by Isis, and embalmed by his son Anubis, gave a religious sanction to the rite, all deceased persons being supposed to be embalmed after the model of Osiris in the *abuton* of Philæ. The art appears as old as 2000 B.C., at least the bodies of Cheops, Mycerinus, and others of the age of the 4th dynasty having been embalmed. One of the earliest recorded embalmments on record is that of the patriarch Jacob; and the body of Joseph was thus prepared, and transported out of Egypt. The process has been described by Herodotus and Diodorus; but their accounts can only refer to their own age, and are only partially confirmed by an examination of the mummies. The following seems to have been the usual rule observed after death. The relations of the deceased went through the city chanting a wail for the dead. The corpse of a male was at once committed into the charge of the undertakers; if a female, it was retained at home till decomposition had begun. The *paraschistes*, or flank-inciser of the district, a person of low class, whose establishment was situated in the cemeteries or suburbs, conveyed the corpse home. A scribe marked with a reed-pen a line on the left side beneath the ribs, down which line the paraschistes made a deep incision with a rude knife or Ethiopian stone, probably flint. He was then pelted by those around with stones, and pursued with curses. Another kind of embalmer, the *tarichcutes*, or preparer, then proceeded to remove the entrails and lungs, with the exception of the heart and kidneys. The brain was extracted by another tarichcutes, by a crooked instrument, through the nose. All this having been effected, the body was ready for the salts and spices necessary for its preservation, and the future operations depended upon the sum to be expended on the task. When Herodotus visited Egypt, three methods prevailed: the first, accessible only to the wealthy, consisted in passing peculiar drugs through the nostrils into the cavities of the skull, rinsing the belly in palm-wine, and filling it with resins, cassia, and other substances, and stitching up the incision in the left flank. The mummy was then steeped in natron for seventy days, and wrapped up in linen, cemented by gums, and set upright in a wooden coffin against the walls of the house or tomb. This process cost a silver talent, which, considering the relative value of ancient money at one third of that at present, would amount to about £725. The second process consisted in removing the brain, as before, but only injecting the viscera with *kedrion*, or cedar oil, and soaking the corpse in a solution of natron for seventy days, which brought away or destroyed the viscera and soft portions, leaving only the skin and bones. The expense was a *mina*, relatively worth about £243. The third process, in use for the poorer classes, washed the corpse in myrrh, and salted it for seventy days. The expense was a trifle, not mentioned. When thus prepared, the bodies were ready for sepulture, but were often kept some time before being buried—often at home—and even produced at festive entertainments, to recall to the guests the transient lot of humanity. When buried, they were sent to the *cholchytæ*, a higher class than the *tarichsutæ*, who had charge of the tombs, the mummies, and the masses for the dead. All classes were embalmed, even malefactors; and those who were drowned in the Nile or killed by crocodiles received an embalmment from the city nearest to which the accident occurred. As the art, however, existed for many centuries, it may be easily conceived that mummies were preserved by very different means, and quite distinct from those described by classical authors, some having been found merely dried in the sand; others salted by natron, or boiled in resins and bitumen, with or without the flank incision, having the brains removed through the eyes or base of the cranium, with the viscera returned into the body, placed upon it, or deposited in jars in shapes of the genii of the dead, the skin

partially gilded, the flank incision covered with a tin plate, the fingers cased in silver, the eyes removed, and replaced. The mummies are generally wrapped in linen bandages, and placed in costly coffins. See SARCOPHAGUS. The sacred animals were also mummied, but by simpler processes than men. Mummies, it may be observed in passing, were used in the 15th and 16th centuries of the Christian era for drugs and other medical purposes, and nostrums against diseases, and a peculiar brown color, used as the background of pictures, was obtained from the bitumen. The Ethiopians used similar means to preserve the dead, and the successful nature of embalming may be judged from the numerous mummies in the different museums of Europe. Other less successful means were used by nations of antiquity to embalm. The Persians employed wax; the Assyrians, honey; the Jews embalmed their monarchs with spices, with which the body of our Lord was also anointed; Alexander the great was preserved in wax and honey, and some Roman bodies have been found thus embalmed. The Guanches, or ancient inhabitants of the Canary isles, used an elaborate process like the Egyptians; and desiccated bodies, preserved by atmospheric or other circumstances for centuries, have been found in France, Sicily, England, and America, especially in Central America and Peru. The art of embalming was probably never lost in Europe; and De Bils, Ruysch, Swammerdam, and Clauderus boast of great success in the art. There was a celebrated cabinet of M. De Rasière in 1727, containing prepared bodies; and the mode of embalming princes and others, by prepared balms and other substances, is detailed by Penicher, consisting in the removal and separate embalmment of the heart and viscera, and removing the brain, and introducing the preparations by incisions all over the body. Dr. Hunter injected essential oils through the principal arteries into the body. Boudet, during the French empire, embalmed the bodies of the senators with camphor, balsam of Peru, Jews' pitch, tan and salt; but the discovery of Chaussier of the preservative power of corrosive sublimate, by which animal matter becomes rigid, hard, and grayish, introduced a new means of embalming by Beclard and Larrey; but owing to the desiccation the features do not retain their shape. The discovery of the preservative power of a mixture of equal parts of acetate and chloride of alumina, or of sulphate of alumina, by Bannal in 1834, and of that of arsenic by Tranchini, and of pyroxilic spirits by Babington and Rees in 1839, and of the antiseptic nature of chloride of zinc, have led to the application of these salts to the embalming or preparation of bodies required to be preserved for a limited time; but there is no reason to believe that bodies so preserved will last as long as Egyptian mummies. See Pettigrew, *History of Mummies* (4to, Lond. 1834); Gannal, *Traité d'Embaumement* (8vo, Paris, 1838), translated by Harlan (8vo, Philadelph. 1840); Magnus, *Das Einbalsamiren der Leichen* (8vo, Braunsch. 1839).

EMBANKMENT, EARTHWORK. Embankments, in engineering, are masses of earth, rock, or other materials artificially formed, and rising above the natural surface of the ground. They are chiefly formed either (1) to carry railways, common roads, canals, etc., over depressions of the country; or (2) for hydraulic purposes, such as the formation of reservoirs for storing water; or as defenses against the overflowing of rivers, the encroachments of the sea, of lakes, etc.

In the formation of canals, railways, and other roads, embankment and *excavation* go hand in hand, and, under the name of EARTHWORK, form—especially in modern times, and since the development of the railway system—a vast branch of industry, giving employment to many thousands of laborers, known in England as "navvies." The earthworks executed within the last quarter of a century in Great Britain alone have cost many millions of pounds.

In planning works of the kind alluded to, engineers follow, as much as possible, the principle of making the cuttings or excavations and the embankments balance; i.e., of making the earth, etc., taken from the cuttings be sufficient for the formation of the embankments. See RAILWAYS (ENGINEERING). In proceeding to the actual construction of a railway embankment, e.g., a beginning is made at the points where the level of the formation meets the surface of the ground; and on each side of these points the cutting is taken out, and the embankment formed by men using pick, shovel, and barrow, so that a roadway is formed for a distance of from 50 to 100 yards. When the "lead," or the distance between the face of the cutting and the "tip-head," or end of the embankment, is greater than this, it is no longer economical to use the barrow. To continue the cutting and embankment, several methods may be employed; the most common are dobbin carts; small wagons run upon light rails at a narrow gauge, and drawn by men or horses; ordinary earth-wagons drawn by horses, and occasionally by a locomotive; and, lastly, ballast-wagons or trucks drawn by a locomotive. The cost of earthwork naturally varies greatly with the nature of the strata in which the cutting has to be made, the length of the "lead," and other circumstances. When rocks have to be cut through, blasting (q.v.) is had recourse to. One of the points on which considerable doubt existed was as to the inclination of the side-slopes of embankments; but it has been found that nearly all kinds of earthwork will stand at an inclination of 1½ horizontal to 1 vertical. When, however, it is necessary to use very wet substances, such as peat-moss or wet clays, or when the embankment is of great height, a flatter slope may be necessary. In many cases, it is advisable to substitute a viaduct (q.v.) for

an embankment. All embankments put in as above mentioned subside more or less, the subsidence being much more distinctly perceptible in clay than in gravel. When clay is thrown by the wagon over a considerable tip, the lower half of the embankment will be seen to consist of round bullets of clay of sufficient hardness to resist being squeezed into one mass by the weight of the embankment, until, in the course of time, from the effects of moisture, they become gradually disintegrated, and a settlement or sinking of the embankment takes place, sometimes to the extent of a twelfth, or even a tenth of the height. The greatest sinking usually occurs during the first wet weather after the formation of the embankment; but it sometimes goes on, though more and more slowly, for years. In the case of railway embankments, this subsidence is seldom of very material importance. If the permanent rails are laid, the labor and expense of restoring them to the level is not great, and the embankment should always be formed sufficiently wide at the top to allow of filling it up to its proper level without adding to the slopes. It is, however, practicable, though rather hazardous, to widen it at the top afterwards by cutting trenches in the slopes.

When the side-slope of the ground on which an embankment is to be formed is very steep, the whole work has a tendency to slip laterally; and to prevent this, trenches or steps are cut in the ground before putting in the embankment. When the material is very wet, it sometimes is impossible to prevent the slopes from bulging out, in which case it is generally sufficient to put in additional stuff until the work stands. Peat-moss is seldom used to form an embankment, but frequently an embankment has to be formed where the ground below is moss to a considerable extent. In this case, many plans have been adopted to form a substantial, unyielding work, which, where the moss is deep, and contains much water, is often very troublesome and expensive. Among these, perhaps, in most cases, the best is to continue throwing in earth until no further subsidence takes place. In some cases, piling has been adopted, and in others, a layer of tree-tops and brushwood has been placed on the moss under the embankment. When this is done, it frequently happens that the ground on each side of the embankment opens in great rents, rises to a considerable height, and moves laterally from the embankment. A good example of this may be seen on the Scottish Central railway, a short distance to the s. of the Bridge of Allan station.

Embankments, when finished, have their side-slopes usually covered with soil and sown with grass-seed; this not only improves their appearance, but adds considerably to their stability, preventing rain and wind from doing the damage that might otherwise take place.

In regard to embankments to restrain or prevent the encroachment of water, it is necessary, in addition to forming them of sufficient height and strength, to cover the surface of the slopes in such a way that the action of the water will not affect it. Of course the method adopted must depend entirely on the nature of the case; where, for example, the water only occasionally touches the embankment, as in the case of river-floods, and does not run with great violence along it, good turf pinned to the slopes has been found effectual. Where, however, the slopes are subject to the action of waves or rapid water, more effectual and expensive measures must be adopted, such as stone-pitching, piling, etc. Embankments of this nature are used on a great scale in Holland. See DYKE.

Embankments for damming up water so as to form ponds or reservoirs, require, in addition to the other conditions, to be perfectly water-tight; and for this purpose a "puddle-wall" of clay is carried from top to bottom in the heart of the structure. The great difficulty lies in preventing the water from finding its way between the bottom of the puddle-wall and the foundation on which it rests, or even through the substances of which that foundation consists; and the wall must often be carried to a great depth below the surface of the ground until an impermeable stratum be found. A knowledge of the geology of the place is here essential to the engineer.

EMBARGO (from the Spanish *embargar*, to in-bar, to arrest) is a temporary order from the admiralty to prevent the arrival or departure of ships. It may apply to vessels and goods, or to specified goods only; it may be general or special; it may apply to the entering only, to the departure only, or to both entering and departure of ships from particular ports; and lastly, although issued by the admiralty in this country, it would be equally an embargo if issued by any other competent authority. Such embargoes are generally connected in some way or other with a state of war between two countries.

EMBASSY. In a popular sense, all diplomatic missions are spoken of as embassies, but such is not the technical meaning of the term. In its more limited acceptation, embassy is a mission presided over by an ambassador, as distinguished from a mission or legation intrusted to an envoy, or other inferior diplomatic minister. In this stricter sense, Great Britain has now only four embassies—those at Paris, Vienna, St. Petersburg, and Constantinople. The only difference between the powers and privileges of the ambassador and the envoy is, that the former represents the person of his sovereign, and in this capacity he can demand a private audience of the sovereign to whom he is accredited; whilst the latter must address himself to the minister for foreign affairs. A residence is provided for the ambassador, and an allowance for house-rent is made to inferior ministers, in addition to their salaries. See AMBASSADOR, ENVOY, CONSUL.

EMBATE'RION, a war-song of the Spartans, accompanied by flutes, which they sung marching in time, and rushing on the enemy. The origin of the E. is lost in antiquity.

EMBAT'TLED, or IMBATTLED, called also *crenellé,* one of the partition lines in heraldry, traced in the form of the battlements of a castle or tower. A bordure embattled is often given as a difference to any member of a family who is, or has been, a soldier.

EMBATTLEMENT. See BATTLEMENT.

EMBER or EMBERING DAYS. According to the *Book of Common Prayer* of the Church of England, three days are appointed four times in the year to be observed as days of fasting and abstinence; these days are the Wednesday, Friday, and Saturday after the first Sunday in Lent, after the feast of Pentecost, after the 14th Sept., and after the 13th Dec. The term "embering" has been variously derived from the Greek *ημεραι,* and from the embers or ashes which in the earliest times were strewed over the head at times of fasting, in token of humility and self-condemnation. But the more correct derivation would appear to be from the Saxon *Ymbrine dagas,* from the Saxon *ymb,* about, and *ryne,* a course or running, the term applied to these fasts because they came round at certain set seasons in the year.—Somner, *Dictionarium Saxonici.* This phrase is used in the laws of Alfred the great, and also of Canute, and corresponds with the term used by the canonists, *jejunia quatuor temporum,* the fasts of the four seasons. Mr. Somner says that the embering days were "times of old chosen and set apart for fasting and prayer for obteyning the fruits of the earth, and to give thanks for the same, whereas at those times they are either sowen, sprung up, coming in their ripenesse, or gathered into the barne, as also to obtaine the grace of the Holy Ghost, when holy orders are given and ministers made." It is to this latter purpose that the Church of England in the present day particularly devotes the ember days, and a special prayer is appointed for use at those seasons.

EMBERIZA and **EMBERIZIDÆ.** See BUNTING.

EMBEZ'ZLEMENT, the felonious appropriation by clerks, servants, or others in a position of trust, of goods, money, or other chattels intrusted to their care, or received in the course of their duty, on account of their employers. It is essential to the crime of E. that the article taken should not have been in the actual or constructive possession of the employer; for if it were, the offense would amount to larceny (q.v.). E. is not an offense at common law; hence, persons guilty of this crime were formerly suffered to escape punishment. In consequence of a flagrant instance of this immunity (Bazeley's Case, ii. Leach, 835), the act 39 Geo. III. c. 85, was passed, whereby E. was made a felony. This act has been repealed, but the law has since been fixed by subsequent enactments, and is now included in the act 24 and 25 Vict. c. 96.

Embezzlement by clerks or servants is punishable by penal servitude or imprisonment. See PUNISHMENT. If the offender be a male under 16, he may also be ordered to be privately whipped, at the discretion of the judge. Questions of much nicety often arose as to whether the facts proved constituted the crime of E. or that of larceny; but this distinction has ceased to be of any importance under the recent acts—the criminal justice act (14 and 15 Vict. c. 100), and the 24 and 25 Vict. c. 96, s. 72—whereby it is made competent, on an indictment for embezzlement, to convict a man of larceny, and *vice versâ.* And hence, whichever of the two offenses is charged against the servant, if the evidence shows he committed the other offense, then he may be found guilty of that other offense, and punished accordingly.

Embezzlement by bankers, brokers, factors, and other agents, is regulated by the above statute, sec. 3, formerly the fraudulent trustees act (20 and 21 Vict. c. 54). These most important statutes have rendered almost every conceivable species of fraudulent misappropriation by bankers and others a punishable offense. In particular, by the latter statute, E. by a bailee (see BAILMENT) is now indictable. Under this provision, a shopkeeper appropriating goods intrusted for repair, may be tried and convicted.

Embezzlement by bankrupts, or rather the pawning or disposing within 4 months before the bankruptcy of goods or any kind of property obtained on credit, is punishable by 2 years' imprisonment. See BANKRUPT.

Embezzlement of letters and newspapers by servants of the post-office, is also made highly penal by 7 Will. IV. and 1 Vict. c. 36. The E. of newspapers is punishable by fine or imprisonment; but to embezzle a letter, subjects the offender in all cases to penal servitude for 7 years; and if the letter contain money or valuables, to penal servitude for life.

Embezzlement of the queen's stores is punishable by penal servitude for 14 years. In regard to this species of E., summary authority was given to comptrollers and other officers named, on proof of E. of government stores below the value of 20s., to fine the offenders to the amount of double the value of the article taken.

In Scotland, the crime of E., or breach of trust, is punishable at common law. The distinction between this crime and that of theft is substantially the same as between E. and larceny in England. In both countries, the criterion relied upon to distinguish these crimes is the question of possession by the owner; but in Scotland the tendency of the decisions of late years has been to regard the appropriation of articles intrusted for a temporary purpose as amounting to theft. In this respect, the law of Scotland agrees

with that of England in regard to E. by a bailee. In Scotand, the appropriation of things found without an owner, would appear, according to Mr. Hume, not to be an indictable offense. Such a case would sometimes be treated in England as larceny (q.v.).

EMBEZZLEMENT (*ante*), in criminal law, consists in fraudulently removing and secreting personal property, with which the party has been intrusted, for the purpose of applying it to his own use. It differs from larceny, which is "the felonious taking and carrying away the personal property of another" by one who has not a legal possession thereof. The moral guilt of embezzlement is often greater than that of larceny, and the laws against it are, therefore, justly severe. This offense has, for some time past, been of very frequent occurrence in this country, many men of previously eminent standing for integrity having been detected in committing it. Trustees and other officers of charitable societies are guilty of embezzlement when they misappropriate the funds committed to their charge.

EMBLA, in Norse mythology, the first woman created. When the gods Odin, Hœnir, and Lodur left their home to wander on the earth, they found Ask and Embla (ash and elm) without power and without destiny; spirits they had not, nor sense, nor blood, nor power of motion, nor fair color. Odin gave them spirit, Hœnir sense, and Lodur blood and fair color. Some have it the gods were Odin, Veli, and Ve. The man they called Ask and the woman Embla. From this pair the human race descended; a dwelling was assigned to them in Midgard (the earth).

EMBLEM, a representation of an object intended to signify or indicate to the understanding something else than that which it directly represents to the eye. The meaning of the E. rests upon its secondary, not its primary signification. E. is often used in a sense synonymous with symbol, under which, as the wider word, it will bemore convenient to treat it.

EMBLEMATA (Gr.), the works of art with which gold and silver vessels were decorated by the ancients. These sculptured figures were generally executed either in the precious metals or in amber. They were called crustæ by the Romans, though the Greek word was also used.

EMBLEMENTS (Fr. *emblaver*, to sow with *blé* or wheat), growing crops of cereal and vegetable productions raised by the labor of the cultivator. Fruits of trees growing on the land, and grass, are not emblements. The law has ever been mindful of the interests of the tenant who has expended his toil and capital in tilling the ground. By the feudal law, when a tenant for life died between Mar. and Aug., his heirs were entitled to the profits for the whole year. By the existing law of England, a tenant for life, or other tenant, whose term may be suddenly and unexpectedly brought to a close, is entitled to reap the crop which he has sown, and to enter the lands after expiry of the term to remove the emblements. By 14 and 15 Vict. c. 25, a tenant at rack-rent (q.v.) under tenant for life is entitled, where the tenancy determines by death of tenant for life, to hold the land till the expiry of the current year. But if a term be brought to an end by the act of the tenant, he is not entitled to emblements. Thus, a tenant for life, who commits forfeiture, or a widow entitled to dower —who, as regards dower-lands, is considered tenant for life—marrying again, are not entitled to emblements. On the death of a tenant, the executor, and not the heir, is entitled to the emblements. By 11 Geo. II., c. 19, E. may be distrained for rent, and by common law they may be taken in execution. The right of life-renters in Scotland to reap the growing crop is somewhat similar to the English right to emblements. See LIFE-RENT.

EMBLICA, a genus of plants of the natural order *euphorbiaceæ*, having a fleshy fruit. *E. officinalis* is a tree found in most parts of India, with a crooked stem, thinly scattered spreading branches, long narrow leaves, minute greenish flowers, and a globular fruit about the size of a gall-nut. The fruit is very acid, and somewhat astringent, which qualities it retains when dry and shriveled. It is used in India as a deobstruent and febrifuge, also for tanning leather, and making ink, and is generally called *emblic myrobalans*.

EMBOLISM (derived from the Greek word *embolon*, a plug) is the term employed by recent pathologists to designate the plugging-up of a vessel by a clot of coagulated blood-fibrin, by a detached shred of a morbid growth from a diseased cardiac valve, etc. It is in cases of ill-nourished, broken-down constitutions, or after a protracted or a debilitating illness, that the morbid tendency of the fibrin to coagulate spontaneously within the veins chiefly exists, and in such cases very trivial circumstances may call it forth, especially if they lead to any pressure on the vessel. Clots, or portions of a clot, may be transported by the blood-current from the venous system to the right side of the heart, and block up the pulmonary artery either entirely or in part: if the occlusion is entire, sudden death is produced; while, if it is only partial, gangrene, or inflammation of a part of the lung, commonly ensues. Many of the sudden deaths of women in childbed (till recently quite inexplicable) are due to this cause, the plug being formed in the inflamed uterine veins, or possibly, in some cases, in the right side of the heart, and passing from thence to the spot where its arrest proves suddenly fatal. Several cases

of this kind are reported in Simpson's *Obstetric Memoirs*. Similar accidents may happen in the arterial system. A detached fragment of a diseased tricuspid or aortic valve of the heart, or a separated fragment of coagulated fibrin, may be driven onwards in the blood-current, and enter and occlude some of the cerebral arteries, causing softness of the brain, by cutting off the due supply of nourishment. For further details, the reader is referred to an exhaustive treatise on this subject published a few years ago by Cohn, entitled *Ueber embolischen Krankheiten*.

EMBOSSING, the art of producing raised figures upon various substances, such as paper, leather, wood, metals, etc. This is usually effected by pressing the substance into a die, the kind of die and mode of applying the pressure being modified according to the nature of the design and the properties of the substance to be embossed. Sheet-metal is embossed by stamping it between a pair of steel dies, one in relief, the other in intaglio. See DIE-SINKING. When the pattern is a deep one, several pair of dies are used, and several blows given with each, the metal being occasionally annealed. The first stamping produces a crude resemblance to the final design, of moderate depth; successive stampings bringing up more of the details, and giving increased depth. The upper die is usually raised by a rope attached over a pulley to a stirrup, in which the workman places his foot; he draws his foot down to raise the heavy die to the required height, and then suddenly releases the pressure of his foot from the stirrup, when the die descends by its own weight. While thus raising the die with his foot, he adjusts the work in its place with his hands. Smaller work is embossed with a screw-press, the lever of which is turned with one hand, while the work is placed under the dies and removed by the other. Paper and card are embossed in a similar manner, but the dies are frequently of brass, sometimes of copper electro-deposits, suitably backed. The counter-die is commonly made of soft metal, card or mill board, pressed into the metal intaglio die until a sharp impression is produced. The paper or card is well damped, and a fly-press is generally used. The leather or cloth for bookbinding is embossed in this manner, the counter-die being usually made by gluing several pieces of mill board together, and gluing them to the upper bed of the press, then stamping these into the lower die until a perfect impression is obtained. The embossing press designed and constructed by Mr. Edwin Hill, for impressing the medallion upon postage envelopes, is a very elaborate and beautiful machine, which inks the die itself, and with the aid of two boys, to place and remove the envelopes, embosses sixty envelopes in a minute. When large surfaces of textile fabrics, such as table-covers, etc., have to be embossed, the fabric is compressed between rollers, one being of metal, upon which the device is sunk like a die; the counter-roller or bed-cylinder is of paper covered with felt; this yields sufficiently to allow the fabric to be pressed into the die-cylinder. A third smooth metal roller is commonly used to press out again the impression made upon the bed-cylinder; this acts upon the bed-cylinder on the side from which the fabric emerges. Paper is sometimes embossed in this manner; and the flatting roller may be dispensed with if the cylinders are sufficiently accurate in their diameters for the pattern always to fall on the same place at each successive revolution. Leather embossed in high relief has been used for ornamental purposes in place of wood-carving, on picture-frames, cabinet-work, etc. The dies are of type-metal or electro-deposits, and the leather is softened or fulled, i.e., worked with water till it contracts and thickens, then it is pressed into the dies by suitable round pointed tools, like modeling tools, made of wood, bone, or copper. When dry, the leather is removed from the molds, and by its elasticity and shrinking it will relieve from very deep and undercut designs.—Mr. Straker's mode of embossing wood differs from all the above, and is very curious and ingenious. When wood is pressed and rubbed with a blunt instrument, the surface yields, and a depression of some depth may be made in it; if the wood be now soaked in water, the depressed portion will rise again to its original level. Mr. Straker takes advantage of this property thus. He rubs down the surface in those parts that are to be finally in relief, he then planes or shaves away the uncompressed portions until the bottom of the depressions are reached and made level with the new surface; the wood is then soaked; the compressed parts rise to their original level, and, of course, in doing so, rise above the portions that have been planed away, and present the required device in relief.

EMBOUCHURE (Fr.), that part of a wind instrument to which the lips are applied to produce the sound.—The term EMBOUCHURE is also applied to the mouth of a river.

EMBOWED, the heraldic term for anything which is bent like a bow. A sinister arm couped at the shoulder, is embowed. When the arm is turned the reverse way, it is said to be counter-embowed.

EMBRACERY, in the law of England, the offense of influencing jurors by corrupt means to deliver a partial verdict. This offense is a species of maintenance (q.v.). The giving of money to be distributed amongst jurors is embracery, though the money be not actually distributed. Not only persons attempting to influence the jury, but jurors themselves attempting unduly to bias the minds of their fellows, are guilty of embracery. The using indirect means in order to be sworn on a jury, is also embracery. This offense is punishable by various old statutes. At present the crime is punishable by 6

Geo. IV., c. 50, which enacts, that every person guilty of embracery, and the jury consenting thereto, shall be punished by fine and imprisonment.

EMBRA'SURES, in fortification, are openings in the parapets, flanks of bastions, and other parts of the defense-works, through which cannon are pointed. The siege-batteries of the enemy have also embrasures. Their use is, to shield as much as possible the guns, gun-carriages, gunners, and interior of the place, and yet leave spaces for the free firing of the guns. Each opening slopes outwards, so as to give a greater sweep to the gun's action.

EMBROCA'TION (Gr. *em*, into, and *brechō*, I wet), the same as liniment (q.v.).

EMBROI'DERY, the art of producing ornamental needlework-patterns upon fabrics of any kind. This art is coeval with the earliest and rudest manufacture of hair and woolen fabrics. It was one of the most important of the early arts in oriental countries, where it is still practiced with great skill and diligence. It is common among most savage tribes that wear any kind of clothing. The blanket-wrapper of the red Indian is commonly ornamented with E.; the Laplander embroiders upon the reindeer skin that forms his clothes patterns worked with needles of reindeer bone, and thread of reindeer sinews and strips of hide. It is practiced as a domestic art in our own country by all classes, from the princess down to the pauper school-girl, and is carried on in large manufactories by very elaborate machinery.

The Chinese are perhaps the most laborious and elaborate hand-embroiderers of modern times; their best work is upon silk. The figures are either in colored silk alone, or in silk combined with gold and silver thread; the figures of men, horses, dragons, etc., being outlined with gold cord, and filled up colored and shaded with silk. The Persians, Turks, and Hindus also still excel in E.; they use, besides silk and gold and silver thread, beads, spangles, pearls, and precious stones. The dress-slippers of Turkish women of all ranks are elaborately embroidered, usually with a precious stone or a glass bead in the middle of the toe-part of the slipper, and a radiating pattern in gold, silver, or brass wire and silk surrounding it. The Turkey carpet is a sort of embroidered fabric. See CARPETS.

Some of the oriental and Indian embroideries include in their work a great variety of materials besides those above mentioned; feathers are largely and very tastefully used; the skins of insects; the nails, claws, and teeth of various animals; nuts, pieces of fur, skins of serpents, etc., are among these. Coins, which are so commonly used as ornaments for the hair of unmarried women in the east, are sometimes also worked into their dresses with the embroidery. This is especially the case with the Turks and Georgians. The Indian women embroider with their own hair and that of animals.

Tapestry is a kind of E., formerly done with the needle, but now chiefly with the shuttle. This kind of work is, in fact, intermediate between E. and weaving, and it is somewhat difficult to determine under which it should be classed, but in accordance with the definition given above, we shall only include needlework under E., and tapestry will be separately treated.

For hand-embroidery, the fabric is usually stretched upon a frame, and the design to be worked is drawn upon it, or some other contrivance is used to guide the worker. If the fabric is sufficiently thin and open, a colored drawing or engraving may be placed behind the work, and followed with the needle. A sheet of thin transparent paper, with lines upon it corresponding to the threads of the canvas to be worked upon, is sometimes used; this is secured by gum or wax to the drawing; and the design is copied by observing the number of small squares occupied by each color, and filling in the corresponding meshes of the canvas. *Berlin-work*, which is a kind of E., is done in a similar manner, the pattern being an engraving on which the lines corresponding to the thread are printed, and the meshes filled up with the required colors, painted in by hand, by women and children, who copy it from the original design of the artist. The name has been given from the fact, that the best patterns have, since 1810, been published by Wittich, a printseller of Berlin.

In France, pricked patterns are sometimes used, one for each color, and colored powders are dusted through the holes upon the fabric to be worked.

All these devices render the art of E. a mere mechanical operation, requiring no further artistic skill or taste than is exercised in knitting stockings; but when the embroidress draws the design in outline upon the fabric, and works in the colors with her needle under the guidance of her own taste, E. becomes an art that might rank with water-color drawing or oil-painting; and it is to be regretted that so much time should be devoted by ladies to the mechanical, and so little effort made in the direction of truly artistic embroidery.

Muslin-embroidery has been very fashionable of late. This is purely mechanical work. The muslin is printed with a pattern made up of holes of different dimensions; these are cut or punched out, and their edges sown with a "button-hole stitch." This kind of work is much used as trimming for ladies' clothing, for collars, and children's clothes.

Machine-embroidery has been practiced with considerable success during the last quarter century. A machine was exhibited in the French industrial exhibition of 1854, by M. Heilmann of Mulhausen, by which one person could guide from 80 to 140 needles,

all working at the same time, and producing so many repetitions of the same design. Although the details of the construction of this machine are rather complex, the principle of its action may be easily understood. The needles have their eyes in the middle, and are pointed at each end, so that they may pass through from one side of the work to the other without being turned. Each needle is worked by two pair of artificial fingers or pincers, one on each side of the work; they grasp and push the needle through from one side to the other. A carriage or frame connected with each series of fingers does the work of the arm, by carrying the fingers to a distance corresponding to the whole length of the thread, as soon as the needle has passed completely through the work. The frame then returns to exactly its original place, and the needles are again passed through to the opposite set of fingers, which act in like manner. If the work were to remain stationary, the needles would thus pass merely backwards and forwards through the same hole, and make no stitch; but by moving the work as this action proceeds, stitches will be made, their length and direction varying with the velocity and the direction in which the work moves. If 140 needles were working, and the fabric were moved in a straight line, 140 rows of stitching would be made. If the work made a circular movement, 140 circles would be embroidered, and so on. In order, then, to produce repetitions of any given design, it is only necessary to move the fabric in directions corresponding to the lines of the design. This is done by connecting the frame on which the work is fixed to an apparatus similar to a common pantagraph, or instrument so constructed that one end repeats on a smaller scale exactly the movements which are given to the other. See PANTAGRAPH. The free end of this is moved over an enlarged copy of the design, the movement being a succession of steps, made after each set of needles has passed through; and thus the work is moved into the position required to receive the next stitch of the pattern.

This machine was subsequently patented in England, and many improvements have been made upon its details, but the principle of its construction remains the same.

Although it is *possible* to embroider any design with such machines, there are only certain designs that can be worked economically; for to do this, the patterns must be so designed as to consume each needleful of silk without waste. The length of silk required for each color can be calculated with extreme accuracy, and the designer is usually limited by this requirement. A greater range is, however, obtainable by dyeing the same thread of silk in different colors, the length of each color corresponding to what is required for producing the pattern; but a large demand for each pattern is required to render this profitable.

EMBRUN, a t. of France, in the department of Hautes Alpes, is situated on a platform of rock in the midst of a plain, on the right bank of the Durance, 20 m. e. of Gap. Seen from a distance, the town has an imposing appearance. The streets of E. are narrow, dirty, and irregular. It is surrounded by loop-holed ramparts and ditches, and strengthened by bastions. The principal buildings are the cathedral, a Gothic edifice, surmounted by a lofty Romanesque tower, and the barrack, formerly the archbishop's palace. E. manufactures broadcloth, counterpanes, hats, cotton-yarn, and leather. Pop. '76, 3,287.

E. occupies the site of the ancient Ebrodunum, capital of the Caturiges, and an important Roman station. The line of its archbishops can, it is said, be traced to the time of Constantine. In modern times E. has been thrice destroyed by fire: by the Moors in 966, during the religious wars in 1573, and by the duke of Savoy in 1692.

EMBRYO (Gr.), an organized being in a rudimentary condition, or the rudiment from which, under favorable circumstances, an organized body is to be developed. In botany, the term E. is applied to the germ formed within the ovule on fertilization, and which increases to become the principal part of the seed. The albumen or perisperm of the seed, being regarded as a mere store of nourishment for the E., is not accounted part of the E.; the cotyledons, however—although a large store of nourishment is often laid up in them—are considered as essentially belonging to it, along with the *plumule*, the *radicle*, and the connecting parts. As to animals, the term E. is used as equivalent with *fœtus*, and as designating the rudimentary animal from the moment of impregnation until the egg is hatched; but although this takes place at very different stages of development in different kinds of animals, and consequent metamorphoses are undergone by some before they reach their perfect state, the term E. is not applied to the *larvæ* and *pupæ* of insects, or to the analogous states of other classes of animals. Eggs contain, along with the E., a store of nourishment for it in the earlier stages of its development. See REPRODUCTION, DEVELOPMENT OF THE EMBRYO, EGG, FŒTUS, OVULE, SEED, and SPORE.

EMBRYOL'OGY. See DEVELOPMENT OF THE EMBRYO.

EMBRYOT'OMY, a division of the fœtus into fragments, to extract it by piecemeal, when the narrowness of the pelvis or other faulty conformation opposes delivery.

EMBURY, EMMA CATHERINE, 1806-63; b. New York; daughter of Dr. James R. Manley. She has published many poems and prose sketches and tales, among them *Guido and Other Poems; Constance Latimer, or the Blind Girl, and other Tales; Pictures of Early Life; Glimpses of Home Life; Nature's Gems, or American Wild Flowers; Love's Token Flowers; The Waldorf Family*, etc.

EMBURY, PHILIP, b. Ireland, 1728; d. Troy, N. Y., 1775; widely known as the "founder of American Methodism." He was of German descent, and came to America in 1760. In 1766, he organized a society in New York, and the next year began to preach in a rigging loft, which place became famous as the cradle of Methodism in this country. The next year a church was built, on the site of the present old John street church, partly by E.'s own hands. About a year later a company of missionaries sent out by Wesley arrived in New York, and Embury went as a missionary to the region around Albany and Troy. He died suddenly from an accident.

EMDEN, a t. in the province of Hanover, once in the principality of East Friesland, is situated a little below the embouchure of the Ems into Dollart bay, in lat. 53° 22' n., long. 7° 13' east. It lies low, but is protected by strong dykes from any inroad of the waters of the bay. Nevertheless, occasional inundations take place; as in 1826, when the water stood up to the first floor of the houses for three months. E., which is the chief commercial town of Hanover, is surrounded by walls and towers, is well built, has spacious and well paved streets, and houses remarkable for their appearance of comfort, and for their extreme cleanliness. It is intersected by numerous canals, which are crossed by about thirty bridges. The Delf canal runs s. from the town to Dollart bay, a distance of about 2 m., but it can be entered at high water only, and even then is not navigable for vessels of more than 13 or 14 ft. draught; all vessels of greater draught being obliged to unload in the roadstead of Delf, at the mouth of the canal. The principal building, and one of the finest public edifices in the whole region, is the town-hall, containing a library and a curious collection of ancient arms and armor. E. stands in a district of great fertility. It has a good deal of ship-building, besides various other manufactures. From this town, from 50 to 60 vessels are sent out to the herring-fishing off Scotland. E. was made a free port in 1751, came into the possession of Holland in 1808, and with the whole of East Friesland, was incorporated with the kingdom of Hanover in 1815. Pop. '75, 12,866.

EMERALD (Sp. *esmeralda*, Fr. *émeraude*, Ger. *smaragd*, Gr. *smaragdos;* the name is originally Semitic, or at least eastern, but the signification unknown), a mineral generally regarded by mineralogists as merely another variety of the same species with the beryl (q.v.), with which it essentially agrees in composition, crystallization, etc., differing in almost nothing but color. The E., which, as a gem, is very highly valued, owes its value chiefly to its extremely beautiful velvety green color. It is composed of about 67 to 68 per cent of silica, 15 to 18 of alumina, 12 to 14 of glucina, and a very little peroxide of iron, lime, and oxide of chromium. Its color is ascribed chiefly to the oxide of chromium which it contains. Its specific gravity is 2.577 to 2.725. In hardness it is rather inferior to topaz. The localities in which E. is found are very few. The finest have long been brought from South America, where they are obtained from veins traversing clay-slate, hornblende slate, and granite, in a valley not far from Santa Fé de Bogota. Emeralds of inferior quality are found in Europe, imbedded in mica slate in the Henbach Valley in Salzburg. They are also found in the Ural; and some old mines in Upper Egypt have also been discovered to yield them, from which, probably, the ancients obtained them. This gem, known from very early times, was highly prized by the ancients. Pliny states that when Lucullus landed at Alexandria, Ptolemy offered him an E. set in gold, with his portrait engraven on it. Many wrought emeralds have been found in the ruins of Thebes. Nero, who was near-sighted, looked at the combats of gladiators through an eye-glasa of E., and concave eye-glasses of E. seem to have been particularly esteemed among the ancients. As a precious stone, the E. is rarely without flaw. Its value also depends much on its color. A very perfect E. of six carats has been sold for £1000.

It appears not improbable that emeralds have been found in the east, in localities not at present known, but the name E. or ORIENTAL E. is often given to a very rare, beautiful, and precious green variety of sapphire (q.v.).

E. COPPER is a beautiful and very rare E. green crystallized mineral, also called DIOPTASE, found only in the Kirghis Steppe, and composed of about 39 parts silica, 50 protoxide of copper, and 11 water.

EMERALD BIRD OF PARADISE, a native of New Guinea, and one of the most beautiful of its order. The skins and feathers are highly prized for ornament, and bring large prices.

EMERSION, the reappearance of one heavenly body from behind another, after an eclipse or occultation. The immersions and emersions of Jupiter's first satellite are particularly useful for finding the longitude of places. Minutes or scruples of emersion are the arc of the moon's orbit passed over by her center, from the time she begins to emerge from the earth's shadow to the end of the eclipse.

EMERSON, GEORGE BARRELL, LL.D., b. Maine, 1797; graduate of Harvard, where he was afterwards tutor in mathematics and natural philosophy. He was a popular teacher in Boston until his retirement from professional life in 1855. He has published a second part to *School and School Master;* a *Manual of Architecture; Report on the Trees and Shrubs growing naturally in the Forests of Massachusetts*, etc. He has been president of the Boston society of natural history, and was chairman of the commission for the zoological and botanical survey of the state.

EM'ERSON, RALPH WALDO, the most celebrated of American philosophers, was b. at Boston, United States, May 25, 1803, entered Harvard university in 1817, graduated in 1821, and became pastor of a Unitarian congregation in Boston in 1829. This office, however, he resigned in 1832, on account of the gradually increasing differences between his own modes of thought and those of his hearers. The next year he spent in England. Since then, he has led a quiet; retired, meditative life, chiefly at Concord. Among the earliest noticeable productions of his pen were two lectures, or orations, entitled *Nature and Man Thinking*, delivered before the Phi Beta Kappa society at Cambridge, United States, in 1837. In the following year appeared his *Literary Ethics, an Oration;* and in 1841, *The Method of Nature, Man the Reformer*, the first series of his *Essays*, and several lectures, etc. Three years later, he issued a second series of *Essays*. In 1846, he published a volume of poems. In 1849, he revisited England, to deliver a series of lectures on *Representative Men*. When published, they were generally reckoned the most vigorous and intelligible of all the author had then written. In 1852, in conjunction with W. H. Channing and J. F. Clarke, he published the Memoirs of Margaret Fuller (q.v.), Marchesa d'Ossoli. *English Traits* appeared in 1856, and the *Conduct of Life* in 1860. In 1865, E. published an *Oration on the Death of President Lincoln;* a second volume of poems in 1868; *Society and Solitude*, a third volume of essays in 1870; in 1871 an introduction to Goodwin's translation of Plutarch's *Morals; Parnassus; Selected Poems;* a fourth volume of essays; *Letters and Social Aims* (1875). He received the degree of LL.D. from Harvard university, U. S., in 1866. There is perhaps no living writer of note regarding whom opinions are so divided as Emerson. Some critics have placed him amongst the profoundest thinkers; others have pronounced him a sciolist and charlatan. No man who is himself sincere will doubt the sincerity of the American philosopher. It is true, however, that the subtlety of his intellect often deceives him by the facility with which it discovers divine meanings in nature and the human soul. E. never pauses to harmonize his thoughts and convictions. He knows that an idea is more forcible and attractive, and can be clothed in more brilliant and picturesque phraseology when it is not qualified, and, as it were, dragged down from its elevation by the influence of other ideas. He loves to watch the play of thought, and to dream and muse about it, borne up on the wing of a pure and delicate imagination, rather than to weigh its significance, or to build it up into an "intellectual system" or a creed. E. thus belongs to the class of minds which are intuitional rather than reflective, and subtle rather than sagacious. His thinking charms, animates, and vividly excites the mental faculty of his reader, but it does not satisfy or settle any question conclusively. Hence his speculations on religion, philosophy, literature, and life, though stimulating to the young, are coldly regarded by men of mature and sage understanding. E. has nowhere formally defined the fundamental basis of his speculation. He appears to be what is called a pantheist, at least he rejects entirely that kind of theism which separates God from nature, and which looks upon him as simply a living spiritual personality. He will not recognize a God who is not "one with the blowing clover and the falling rain." In regard to man and his destinies, he entertains exalted hopes; but religion is not in his eyes a divinely revealed (in the ordinary sense) or infallible thing; all creeds are merely "the necessary and structural action of the human mind" in the course of its historical progress. Man made them all (Christianity included), and he believes, that from the inexhaustible depths of our nature there will come forth in due time new and ever higher faiths, which will supersede those that have gone before. E. is often said to have derived a good deal of his thinking from Thomas Carlyle. This is true, but not in any sense that can justify the vulgar criticism which makes him out to be a "Yankee pocket-edition of Carlyle." He is essentially an original and independent genius. Some of his writings have been translated into French, and have excited considerable admiration among the Parisian transcendentalists. See Montégut's *Essais de Philosophie Américaine* (1851).

EMERSON, RALPH WALDO, LL.D. (*ante*); an eminent American poet and essayist, b. Boston, May 25, 1803. He is of a clerical lineage, being the eighth in succession of a consecutive line of Puritan ministers. His father, who died when he was but seven years of age, was the Rev. William Emerson of the First church in Boston. He was fitted for college in the Boston public Latin school, entered Harvard in 1817, and graduated in 1821. His tastes were literary rather than scholastic. In the Latin school he wrote verses for exhibition days, and in college the library had for him more charms than the text-books. His rank as a student was not above that of some others in his class, though he took two prizes for dissertations and one for declamation, and was the class-day poet at the time of his graduation. For five years after leaving college he was engaged with his brother William in teaching a successful school for girls in Boston. During this time he must have given attention to theological studies, for he was "approbated to preach" in 1826. After this, for the benefit of his health, he passed a winter in South Carolina and Florida. In Mar., 1829 he was ordained as colleague of the Rev. Henry Ware in the Second Unitarian church in Boston. His pastorate was short, for he soon found himself entertaining scruples concerning the ordinances of the church, and especially unwilling to administer that of the Lord's Supper. His resignation of his pulpit and of the ministry for such a reason made no little stir in the Unitarian denomi-

nation, and in the other Christian sects, being regarded as a very strange event. The parting between him and his congregation, in 1832, was most honorable and affectionate on both sides, for, as a preacher, he had won popularity and favor. He now went to Europe for a year, and on his return, in the winter of 1833–34, he began in Boston his eminent career as a lecturer, with a discourse upon "Water," before the Boston manufacturers' institute. Three other lectures, two upon "Italy," and one on "The Relation of Man to the Globe," were delivered during the same season. Shortly after this he delivered in Boston a course of biographical lectures on Michael Angelo, Milton, Luther, George Fox, and Edmund Burke; the first two of which appeared afterwards in the *North American Review*. Since that day, until within a few years past, he has been among the most conspicuous and popular of American lecturers, traveling extensively in the eastern, northern, and western states, and attracting large audiences, less by any oratorical gifts than by the solid value of his thoughts. In some places he has been a great favorite, speaking by invitation for the fortieth or fiftieth time in the same lyceum course, with undiminished interest. In 1835, Emerson took up his residence in Concord, Mass., where he still remains, the foremost citizen in the place, sharing the love, honor, and reverence of all the people, without distinction of party or sect. In 1835, and the three or four following years, he delivered in Boston successive courses of lectures on English literature, the philosophy of history, human culture, human life, and the times. In 1834, he delivered a poem before the Phi Beta Kappa society of Harvard; in 1837, an oration before the same society upon "The American Scholar;" and in 1838, an address to the senior class of the Cambridge divinity school, which created no little stir in the literary and theological world. His first book, a thin volume entitled *Nature*, appeared in 1836, and was received by a few enthusiastic admirers as opening a new era in American thought, while in some quarters it was sharply criticised. In 1841, appeared *The Method of Nature*, which developed more fully the peculiar qualities of his mind and his ways of thinking, and by its freshness and beauty won him many admirers. For reasons which to many leaders of popular thought were incomprehensible, he was rapidly gaining a strong hold upon the affection and reverence of an increasing multitude of his countrymen, and winning the attention of thoughtful men on the other side of the Atlantic. The "transcendental" movement, so called, was coincident with the appearance of his earliest works, and received from them both impulse and direction. In 1840, appeared a quarterly magazine entitled *The Dial*, with Miss Margaret Fuller as editor, assisted by A. Bronson Alcott, William H. Channing, Emerson, Theodore Parker, George Ripley, and others. This periodical was continued four years, during the last two of which Emerson was the editor. Two volumes of *Essays* were Emerson's next issues, the first appearing in 1841, the second in 1844. His collected *Poems* were published in 1846. In 1847, he visited England to fulfill engagements as a lecturer, and was warmly received by the lovers of his books, and by the public generally. In 1849, he collected into a volume of *Miscellanies* his "Nature," and nine lectures and college addresses, which had previously appeared in *The Dial*, or in pamphlet form. In 1850, appeared his *Essays on Representative Men*, a work of great interest and power. In 1852, he assisted in preparing the memoirs of Margaret Fuller Ossoli. In 1856, he published *English Traits*, a work which well illustrated his powers of accurate observation, and his clear understanding of the workings of human nature under various conditions. Next appeared, in 1860, *The Conduct of Life*, a work which brings clearly to view the exalted moral and ethical principles which underlie and pervade all that he has written. A subsequent volume embraced a portion of his contributions to the *Atlantic Monthly*. In 1867, appeared a volume of his poems, *May Day and Other Pieces*. In 1870, he published *Society and Solitude*, and in 1869, appeared his *Prose Works Complete*. In 1875, he published four series of *Essays*. In 1878, in the *North American Review*, appeared a paper, *Sovereignty of Ethics*, which fixed the public attention as the ripest fruit of his broad culture; and in 1880, the *Unitarian Review* published, under the title of "The Preacher," his address of 1879 in the divinity chapel at Cambridge. He is now, in a serene old age, reported as being engaged in revising for the press his remaining MSS., which will not probably see the light until after his death. In the midst of his literary labors Emerson has found time to manifest his interest in great public questions as they arose. Some of his letters upon passing events in the newspaper press have exerted a wide influence. While he was a pastor in Boston he opened his pulpit to an earnest protest against American slavery, and during the whole period of the antislavery agitation he constantly manifested his sympathy with those who sought to deliver the land from the curse of human bondage. In 1844, he gave emphatic expression to his views in an address delivered upon the 1st of Aug., the anniversary of emancipation in the British West Indies. Though not in the technical sense of the word a reformer, his habits and tastes being rather those of a scholar and man of letters, every earnest movement for the welfare of humanity has had his sympathy. He gave his name to the call issued in 1850 for the first convention ever held in Massachusetts to secure for women equal rights with men as citizens and voters. He is a member of the American academy of arts and sciences, of the American philosophical society, of the Massachusetts historical society, and a vice-president of the free religious association. He is also a member of the board of overseers of Harvard university, from which he received the degree of doctor of laws in 1866. His writings, though marked by an eth-

ical and spiritual vitality of the highest order, are utterly devoid of system, and pervaded by a certain mystical quality, charming to some but bewildering to others. His intellectual gems are profusely sown throughout his pages according to no visible or conscious method, and with settings that seem quite accidental; but they glow with a genuine luster wherever found. To the arts and processes of the logician he pays no regard, evidently thinking that they tend to belittle, rather than exalt, the truth. He simply affirms what he believes, making his appeal at every step to the moral intuitions of the reader, in the faith that the "spirit of man is the candle of the Lord," with a power of illumination adapted to every emergency. His position is clearly indicated in a simple sentence from his address at the divinity school in 1838: "The assumption that the age of inspiration is past, that the Bible is closed, the fear of degrading the character of Jesus by representing him as a man, indicate with sufficient clearness the falsehood of our theology." His earlier writings are supposed by some to show a drift towards pantheism, but others repel this interpretation as unjust. Certainly he has never called himself a pantheist, and there is unquestionable evidence that whatever may have been his former speculations, that name cannot truly be applied to him now. His friend A. Bronson Alcott reports him as saying: "I do not care to classify myself with any painstaking accuracy with this sect or with that; but if I am to have any appellation at all of a religious kind, I prefer to be called a Christian theist. You must not leave out the word Christian, for to leave out that is to leave out everything." Confirmation of this is to be found in his latest publication, *The Preacher*, in which he says: "Unlovely, nay, frightful, is the solitude of the soul which is without God in the world. To see men pursuing in faith their varied action, warm-hearted, providing for their children, loving their friends, performing their promises—what are they to this chill, houseless, fatherless, aimless Cain, the man who hears only the sound of his own footsteps in God's resplendent creation?"

EMERY (Fr. *émeril*, Ger. *schmergel*, Gr. *smiris;* allied to *smear*), a variety of corundum (q.v.), or of the same mineral species of which corundum and sapphire (with oriental ruby, etc.) are also varieties. It agrees with them very perfectly in composition, hardness, and specific gravity; but is dull, opaque, and not crystallized, sometimes of a grayish black, and sometimes of a blue color. It occurs both massive and disseminated. Its masses, although very compact, have a somewhat granular structure. It is found in several parts of Europe, in Asia Minor, Greenland, etc., generally in masses scattered through aqueous deposits, but in one locality in Saxony in beds of steatite in a schistose rock. The E. of commerce is chiefly obtained from the island of Naxos. Being very hard, it is much used for grinding glass and polishing metals and other hard substances. It is found in lumps, having a granular structure. It is composed of alumina, oxide of iron, and silica, with a little lime, in proportions varying considerably with different specimens. The following may be taken as an average: alumina, 82; oxide of iron, 10; silica, 6; lime, 1½.

It is prepared for use by first breaking it into lumps about the size of a hen's egg, then crushing these to powder by stampers. It is then sifted to various degrees of fineness, which are numbered according to the meshes of the sieve. Plate-glass manufacturers and others separate E. powder into different degrees of fineness by the method of *elutriation* (q.v.). A number of copper cylinders of graduated capacities are placed in a row, and filled with water; the E., churned up with an abundance of water, is admitted by a pipe into the smallest, it then passes to the next in size, and finally flows from the largest; and thus, as a given quantity of water with E. suspended in it, passes in equal times through vessels of varying capacities, the amount of agitation will obviously be greatest in the smallest vessel, least in the largest, and in like proportion with the intermediate; the largest particles, therefore, sink in the smaller vessel, and so on till only the very finest will reach the largest vessel. In this manner, any number of gradations of fineness may be obtained, according to the number and sizes of the vessels. Elutriation in oil or gum-water is sometimes used on a smaller scale, the E. being stirred up in the liquid, and portions poured off at different intervals of time, the finest being, of course, the last to settle. The use of the oil or gum is to make the subsidence take place more slowly.

E. thus prepared is used for a great many important purposes in the arts. Being next in hardness to diamond-dust and crystalline corundum, the lapidary uses it for cutting and polishing many kinds of stone. Glass-stoppers of all kinds are ground into their fittings with it. Plate-glass is ground flat by its means; it is also used in glass-cutting, and in grinding some kinds of metallic fittings. When employed for the polishing of metals, it has to be spread on some kind of surface to form a sort of fine file. *E. paper*, *E. cloth*, *E. sticks*, *E. cake*, and *E. stone*, are various contrivances for such purposes.

E. paper is made by sifting E. over paper which has been covered with a coating of glue. It is used either by wrapping it round a fine file, or a stick, or in the hand, according to the form of the work. See POLISHING OF METALS.

E. cloth is made like E. paper, with coarse calico substituted for the paper. The E. does not adhere so well as to paper, and it is therefore not used by metal-workers, who work E. paper till smooth with wear, but is chiefly used for purposes where the hand alone is used, and paper would tear.

E. sticks are used for the same purposes as E. paper wrapped round files; they are made of deal sticks shaped like files, then glued over, and dipped once or twice in a heap of emery.

E. cake is a compound of bees-wax, suet, and E., melted and well worked together. It is applied to buffing wheels, etc.

E. stone is a kind of earthenware mixed with E., formed by pressing a mixture of clay and E. into suitable molds, and then firing, like common earthenware. It is molded into wheels, laps, etc. Its hardness and cutting power are very considerable.

EMESA. See HEMS, or HOMS.

EMET'ICS, medicines given for the purpose of producing vomiting (q.v.). They are given when it is desirable to relieve the stomach of some noxious or indigestible substance, as a narcotic poison, or excess of food, or some special article of diet which has disagreed. E. are also administered in cases of fever, where the copious secretion they produce from the glands of the stomach and intestines is supposed to have a directly curative effect, aided, perhaps, by the sedative action of E. upon the circulation and nervous system. There is a considerable amount of evidence to show, that E. have the power of cutting short typhus and other fevers in the earliest stage, and afterwards of making the attack of the disease less severe. In diseases of the respiratory organs, E. are given as the quickest and safest method of removing accumulated mucus from the air-passages; and in croup (q.v.), their action is especially favorable, being often followed by expectoration and a rapid improvement in the suffocative symptoms. E. are to be given with great caution, however, in all very depressed states of the system, as their primary action is to produce nausea (q.v.), which is attended always with more or less diminution of the vital power, and often with great depression of the heart's action, amounting to syncope or fainting. The principal E. are the preparations of antimony, zinc, and copper; ipecacuanha in powder or in wine; squill, lobelia, and, generally speaking, the whole class of expectorants and irritants; the latter of which, however, with the exception of sulphate of zinc, and perhaps mustard and water, form a dangerous kind of E., which should never be administered when the milder kinds can be procured.

E'METINE is the alkaloid which forms the active principle of ipecacuanha root. It is a yellowish-white powder, which is slightly soluble in cold water, but dissolves readily in alcohol. When taken internally, it exhibits violent emetic properties, $\frac{1}{20}$th of a grain being sufficient to cause vomiting. See IPECACUANHA.

EMIGRA'TION is the passing from one part of the world to another for the purpose of permanently settling in it. People going thus from one district of the same state to another—especially if it be a distant part, with different habits and physical peculiarities—are sometimes said to emigrate, and in this way the term has been often applied to the English and Scotch settlers in Ireland. In its established signification, however, the word now refers to those who leave the state or dominions in which they have heretofore lived, and in this sense the term applies to those going to the colonies, though these are, like the United Kingdom, under the authority of the British crown. In the country which people leave, they are called emigrants or wanderers out—in that in which they settle, they are usually called immigrants. Jacob and his family were immigrants to Egypt, and their descendants became emigrants from that country when they went to inherit the promised land.

The Greeks were addicted to E., owing, it has been said, to the many political contests which drove the weaker party from home. Greek emigrants planted colonies on the borders of the Mediterranean and the Black sea, carrying them as far northward as France, where they established the city of Marseilles. The Romans were great colonizers, but by conquest rather than emigration. They disliked leaving Italy; and the military and civil officers necessary to rule a colony were generally the only Romans who abode in it. These even did not, in general, settle in the colonies with their families, but were recalled after a certain period of service, the whole arrangement much resembling that for the government of British India.

The migrations of the northern tribes who overran the Roman empire, are well known in history; their wanderings may be said, indeed, to have continued down to the 13th century. Those who wandered from the north into France, where they acquired great territories, became known as Normans, and were remarkable for entirely throwing off the language and manners, and even all the traditions of their original homes, and becoming the most civilized and courtly portion of the French people. But though thus changed, they still continued to wander, spreading over Britain, Sicily, and the intervening portions of Europe.

The discovery of America opened a vast new field for E., which was taken immediate advantage of by the Spanish and Portuguese, and later, by the British, the French, the Germans, and the Dutch. In the 17th c., many of the English Puritans, persecuted in, or discontented with, their own country, found it more congenial to their tastes to live together in a new country, where they would be free from the presence of those who did not sympathize with them, and they thus founded the New England colonies. It is singular that, in the 19th c., an attempt should be made to revive the plan of emi-

grating for the purpose of maintaining an exclusive church, as, for instance, in the English high church colony of Canterbury, and the Scotch free church colony of Otago.

The E. fields at the present day are the territory still called the United States of America, the British colonies in America, and the colonies in South Africa, Australia, and New Zealand. There is a great distinction to be taken between colonies fit for E. and those dependencies of the British crown held for other purposes. India, for instance, the greatest dependency of the crown, is totally unsuited for emigration. The British people who go there, with the exception of a few merchants, go to form the civil and military staff which rules the country. They stay there no longer than they can help, and instead of living on from generation to generation, send home their children in early youth, families of British origin having a tendency to degenerate, both physically and mentally, by long residence there. It is useless for working-people to go there, as every kind of work is done in some way or other by the natives much cheaper than it could be by Europeans, and the same may be said of every colony in the hot latitudes.

As a question in political economy, opinions about E. have oscillated violently. At one time it has been prohibited, at another encouraged by all kinds of tempting offers held out to emigrants, while teachers of political economy have proclaimed that there can never be too much emigration. The conclusion to which we are coming in this, as in so many other questions in political economy is, that what is good for the individual members of a community is good for the community collectively—if people can improve their condition by emigrating, it is as well that they should emigrate; but if otherwise, they had better stay at home. It might seem unnecessary to promulgate a doctrine which every man's self-interest should teach him, but unfortunately E. is one of the matters on which the populace have been liable to delusions which have produced great mischief. Sometimes poor workmen have crowded in where labor was superabundant and capital deficient; at others, men have taken their capital to districts where there was no employment for it, and the unnaturally high price of the necessaries of life has immediately absorbed it all. Young gentlemen, with nothing but showy accomplishments, have gone to the backwoods of America, where they could only prosper by ceaseless toil in felling and clearing. Ambitious, discontented artisans have wandered to the wide pastures of Australia, where they could only get a scanty subsistence as hut-keepers or assistant shepherds, not having skill enough to be intrusted with the charge of stock. Such mistakes have originated from people's ignorance of the fate of those who have gone before, it being generally taken for granted that the emigrant has gone away for his benefit, whereas it has often been for his ruin, and to meet an untimely death.

The standard difficulty is the want of adjustment of capital to labor. This is enhanced by the circumstance, that those who wish to emigrate are generally persons feeling the pressure of poverty at home. The man, however, who goes to a place where there is no capital to employ him with—either his own or some other person's—is just in the position of a shipwrecked mariner cast on the shore. Government interference has been found necessary for the protection of emigrants. Before he leaves his own country, the intending emigrant, through means of agents, cannot only be shipped for a distant port, but can contract for his removal inland to his final place of settlement, and can even contract for the purchase of a plot of ground, or for the sale of his labor. The temptations and the opportunities for imposition in contracts to be fulfilled so far away from the place where they are undertaken, are obvious, and the instances of cruelty and rapacity exhibited in the E. trade are among the most atrocious that have ever disgraced human nature. These led to the appointment of a department of government called the E. commission, and to the passing of the passengers' act of 1849, which regulates the build and character of the vessels which may carry emigrants to certain points, limits the number that may be conveyed, requires the sufficiency of the provisions and other stores to be certified, and provides for proper medical attendance. The British government cannot, of course, enforce obedience to their regulations in vessels belonging to citizens of the United States, after these have gone to sea; but before allowing such vessels to receive emigrants, the owners must find security in this country for the performance of their undertakings, and to a considerable extent the American government has co-operated with ours for the protection of emigrants.

The greatest amount of E. from any one country is from the United Kingdom. There is also a continual stream of E. from Germany, which has formed several separate German communities in the States of America, and also in the British colonies there, and in Australia. A new kind of E., which has come under the charge of the British authorities, is that of hill coolies from India, and of Chinese, both for the purpose of supplying free labor in the sugar-growing and other tropical colonies where Europeans cannot work with safety. A difficulty which more or less attends all kinds of E. is peculiarly felt in this kind—that of keeping the two sexes nearly equal.

The "thirty-fourth report of the E. commissioners" is for the year 1872. The commissioners state that, as the administration of the passenger act has been transferred to the board of trade, it is the last report which they shall have to make on E. from this country. The following table shows the number and nationality of emigrants from the United Kingdom in 1870, 1871, and 1872:

	English.	Scotch.	Irish.	Foreign.	Not Distinguished.	Total.
1870	105,203	22,935	74,283	48,396	6,033	256,940
1871	102,452	19,232	71,067	53,246	6,438	252,435
1872	118,190	19,541	72,763	79,023	5,696	295,213

The E. of 1872 was the largest since 1854, and exceeded the average E. of the previous 17 years by 109,971. But it included a large proportion of foreigners who emigrated through this country—the number of whom was inconsiderable before 1864—and the real excess of the British E. of 1872 over the average of the preceding 17 years was only 53,521. Of the emigrants from our own population in 1872, the English were 56.15 per cent; the Scotch, 9.28 per cent; and the Irish, 34.57 per cent. The proportion of English to Irish emigrants in 1872 was as under:

	English.	Scotch.	Irish.	Foreign.	Not Distinguished.	Total.
United States, North America	82,339	12,691	66,752	68,137	3,828	223,747
British North American colonies	16,691	4,254	3,437	7,805	18	32,205
British Australian colonies	11,611	1,571	2,066	610	18	15,876
All other places	7,549	1,025	508	2,471	1,832	13,385
Totals	118,190	19,541	72,763	79,023	5,696	295,213

In the 58 years, from 1815 to 1872 inclusive, there left the United Kingdom 7,561,285 emigrants; of whom 4,906,262 went to the United States of America; 2,473,173 to British colonies; and 182,850 to other places. The average annual E. was 130,366 for the 58 years ending 1872; 230,223 for the 10 years ending 1872; and 206,556 for the 24 years ending 1876. Of a total of 138,222 emigrants from the United Kingdom in 1876, 109,469 were distinguished as of British origin.

EMIGRATION (*ante*). See IMMIGRATION.

EMIGRATION OF PAUPERS. The manifest advantages derivable both to themselves and the community which supports them from the emigration of paupers, and more particularly of pauper children, to the colonies, have led to several legislative provisions on the subject. The object of these enactments is, on the one hand, to facilitate pauper emigration, and, on the other, to prevent it from being pressed on paupers by the guardians to the extent of interfering with their personal freedom of choice. By 4 and 5 Will. IV. c. 76, s. 62, parishes in England and Wales are empowered to raise funds by a yearly rate for defraying the expenses of poor persons willing to emigrate. The sums advanced may be recovered from any person above the age of 21, who (or whose family or any part thereof), having consented to emigrate, shall refuse to do so, or who having emigrated, shall return. 11 and 12 Vict. c. 110, empowers the guardians of a parish to promote the voluntary emigration of the poor who are irremovable, in accordance with the provisions of the statute above cited, and to charge the expenses upon the ordinary funds for the relief of the poor. By 12 and 13 Vict. c. 103, s. 20, guardians are empowered to expend a sum not exceeding £10 for each person, on the emigration of paupers having settlements in their union or parish, without a previous vestry meeting. 13 and 14 Vict. c. 101, s. 4, enacts that it shall be lawful for the guardians of any parish or union to expend money in the emigration of any poor orphan or deserted child under the age of 16 years, having no settlement, or the place of whose settlement is unknown, and to charge the expense so incurred to the same parish to which such orphan or deserted child was chargeable at the time of the emigration. The section concludes with the provision, that no emigration of any such orphan or deserted child, under any of the above-mentioned powers, shall take place until such orphan or deserted child shall have consented thereto before the justices assembled in petty sessions, and a certificate of such consent, under the hands of two of the justices present thereat, shall have been transmitted to the local government board.

These statutory provisions do not apply to Scotland, and there are no corresponding clauses in the Scottish acts, except in the drainage and improvement acts of Scotland, 14 and 15 Vict. c. 91, and 19 and 20 Vict. c. 9, which enabled owners of lands in the highlands and islands of Scotland to ask grants of money to assist emigration of the poor population. This was allowed on inquiry, and with consent of the board of supervision, the owner paying part of the expense. But parishes generally have no similar powers. Directors of ragged schools are prevented from trying the experiment of sending the children to the colonies, by want of funds, as well as by want of arrangements for their reception on arrival.

ÉMIGRÉS, the name given more especially to those persons who quitted France during the revolution. After the insurrection at Paris, and the taking of the Bastile, 14th July, 1789, the princes of the royal family departed from France. They were followed, after the

adoption of the constitution of 1791, by all who considered themselves aggrieved by the destruction of their privileges, or who were exposed to persecution. Nobles quitted their châteaus; officers, with whole companies, passed the frontiers. Crowds of priests and monks fled to escape the oath of allegiance to the constitution. Belgium, Piedmont, Holland, Switzerland, and, above all, Germany, were overrun with fugitives of every age. Only a few had been able to save their property; the greater portion were in a state of destitution, and sank into utter demoralization. A court had formed itself round the princes at Coblenz; a government, with ministers and a court of justice, had been established, and communication was kept up with all the foreign courts unfavorable to the revolution. This conduct imbittered France, aggravated the position of the king, and drove the revolutionary party forward in their sanguinary career. Under the command of the prince of Condé, a body of É. was formed, which followed the Prussian army into Champagne. The result was that the severest laws were now put in force against the émigrés. Their lands were confiscated. The penalty of death was proclaimed against any one who should support or enter into communication with them. Thirty thousand persons were placed upon the list of É., and exiled forever from the soil of France, although many of them had refused to bear arms against their country. Not until after the failure of their attempt to land at Quiberon in 1795, did the É. abandon all thoughts of penetrating into France by force of arms. Condé's corps, after the peace of Luneville, was obliged formally to dissolve, and sought an asylum in Russia. Even under the directory, however, many had endeavored to obtain permission to return to France. The general amnesty proclaimed by the first consul was therefore joyfully hailed by the greater portion of the émigrés. Many, however, did not return home till after the downfall of Napoleon. Dignities, pensions, and offices were now showered upon these faithful adherents; but, according to the charter of 1814, they were unable to recover either their estates or their privileges. Finally, on the motion of the minister Villèle, the É. who had lost their landed estates, by the law of the 27th April, 1825, received a compensation of 30 million francs yearly on the capital of 1000 million francs. After the July revolution, however, the grant was withdrawn. Compare Antoine de Saint-Gervais, *Histoire des Émigrés Français* (3 vols., Paris, 1823), and Montrol, *Histoire de l'Emigration* (2d edit., Paris, 1825).

EMIL'IAN (or ÆMILIAN) **PROVINCES**, a name now employed to designate a portion of the recently formed kingdom of Italy, comprising the northern part of the states of the church (the Romagna), and the duchies of Parma and Modena. The name is derived from the ancient *Via Æmilia* (a continuation of the *Via Flaminia*, or great northern road), which passed through these territories. The E. P. were formally annexed to Sardinia in April, 1860. See ITALY.

EMINENCE, a title given to cardinals by Urban VIII. Up to the period of his pontificate, they had been called most illustrious and most reverend. The assumption by the Roman Catholic clergy of this and other ecclesiastical titles, not having reference to any "pretended province, or to any pretended see or diocese," are not struck at by the act 14 and 15 Vict. c. 49, to prevent the assumption of certain ecclesiastical titles in respect of places in the United Kingdom. See ECCLESIASTICAL TITLES ASSUMPTION ACT.

EMINENT DOMAIN, the original ownership retained by the state, by which land or other private property may be taken for public use or benefit. It is the highest and most exact idea of property remaining in the government, or in the aggregate body of the people in their sovereign capacity, giving the right to resume possession in the manner directed by law. If the proper authorities propose to open a street, or charter a railroad, or set apart land for a park, or for any lawful and reasonable purpose, and the owner of lands in the route or space desired refuse to sell or ask an unreasonable price, the state by eminent domain has the power of control, and process may be issued from a court having authority to compel the surrender of the property. The constitution of the United States limits the exercise of this right to cases where the public good demands it, and requires compensation to those from whom the property is taken. These conditions are also named by many of the state constitutions.

E'MIR, an Arabic word, equivalent to "ruler," is a title given in the east, and in the n. of Africa, to all independent chieftains, and also to all the actual or supposed descendants of Mohammed through his daughter Fatima. The latter are very numerous throughout the Turkish dominions, but although entitled by birth to be classed among the first four orders of society, they enjoy no particular privileges or consideration; on the contrary, they are found engaged in all sorts of occupations, and are to be met with among beggars, and the lowest of the populace, as frequently as among the mollahs. Their privileges are confined to a few unimportant matters, chiefly to the exclusive right to wear turbans of a green color, that having been the favorite color of the prophet. They are placed under the supervision of the emir-beshir. In former times, the title of emir was borne by the leaders in the religious wars of the Mohammedans, as well as by several ruling families, such as the Thaherides and Samanides in Persia, the Tulunides in Egypt, the first seven Ommaiades in Spain. The title emir, in connection with other words, likewise designates different offices. *Emir-al-Mumenin*, "prince of the faithful," is the title assumed by the caliphs themselves; *emir-al-mus-*

lemin, signifying the same thing, was the title of the Almoravides. *Emir-al-Omrah*, "prince of princes," was the title of the first minister, under the caliphs and the East Indian Moguls, who united in his own person the highest civil and military dignities. It is now the title of the governors of different provinces. The Turkish master of the horse is styled *emir-achor;* the standard-bearer, *emir-alem;* and the leader of the caravans of pilgrims to Mecca, *emir-hadji*. *Ameer* or *amere* is another spelling of the same word.

EMILY, an Irish see, united to Cashel in 1568.

EMMAN'UEL, EMANUEL, or IMMANUEL, a Hebrew name, whose signification—"*God with us*"—is not, by itself, proof that he to whom it would be given was divine. This and similar combinations of divine names were, and still are, in ordinary use among Jews. But the evangelist Matthew (i. 23) applies it in a special manner to the child Jesus; and the whole history of the nativity is in harmony with the special application. Some Christian interpreters consider that the reference (Is. vii. 14) to the birth of the Messiah is direct and exclusive. But the prophecy itself and the circumstances in which it was spoken evidently call for a speedy fulfillment according to the ordinary laws of nature, the virgin being one whom the prophet was commanded then to marry, and her son the child spoken of, under another name, in the eighth chapter. Yet, besides this, as many interpreters believe, the prophecy was designed to have a secondary and full accomplishment in the miraculous conception and birth of Jesus Christ from his virgin mother. This is proved not simply by Matthew's application of the prophecy and by the New Testament account of the nativity, but also by the whole subsequent exhibition of the character and work of Jesus in attestation of his claim to be the incarnate Son of God.

EMMANUEL COLLEGE, CAMBRIDGE, was founded in 1584 by sir Walter Mildmay, chancellor of the exchequer and privy-councilor in the reign of queen Elizabeth. The foundation fellowships are thirteen in number. These fellowships are open to all her majesty's subjects, and a candidate becomes eligible to them on proceeding to the degree of B.A. or any equivalent degree. All the foundation fellows are obliged to proceed regularly to the further degree in arts, law, medicine, or any other faculty they have selected. There must be four of them always in priest's orders; and any who are not tutors or bursars in the college, are bound to be in orders at the end of the seventh year of their fellowship, at the risk of forfeiting it three years afterwards. The college also possesses two fellowships and four scholarships on sir Wolstan Dixie's foundation (but the Dixie fellows have no voice in college affairs, nor any claim to the offices or dividends of the college); 21 scholarships (13 of £70 a year, 5 of £30, and 3 minors of £70), paid from the general revenues of the college; five of £30 a year, founded by Dr. Thorpe; and other seven (4 of £35, 2 of £50, and 1 of £16), for which candidates from certain schools have a preferable claim. The patronage of the college consists of 24 benefices, situated in the eastern and south-western counties of England; and of two schools, one in Norfolk, and the other in Suffolk. This college had in 1879, 313 members of senate, 107 undergraduates, and about 370 members on the boards.

EMMEN'AGOGUES, medicines intended to restore, or to bring on for the first time, the menstrual excretion in women. The E. chiefly in use are the preparations of aloes, iron, myrrh, and other stimulants in connection with purgatives; and also the local use of the warm bath, leeches, fomentation, etc. Some recommend still more powerful and direct applications to the uterine mucous membrane; as galvanic pessaries, lunar caustic, scarifications, etc.; but these are not in general use. See MENSTRUATION.

EM'MERICH, a t. of Rhenish Prussia, is situated on the right bank of the Rhine, on the borders of Holland. It is a very old town, and has a Dutch character of cleanliness. It has a custom-house, an orphan-house, a gymnasium, and several churches. E. has manufactures of tobacco, chocolate, leather, and liquors. Pop. '75, 8,117.

EMMET. See ANT.

EMMET, ROBERT, 1788–1803; b. Dublin, a school-fellow and college-mate of Moore, the poet. Both were members of the historical society, and ardent champions of the cause of freedom for Ireland. In 1798, Emmet was expelled from the university on account of his connection with the United Irishmen. He went to the continent, where he remained until 1802; then returned secretly to Dublin and endeavored to plan a general revolution. July 23 of that year, he made an attempt to seize the arsenal and city of Dublin; but his mob of followers created scarcely a serious riot, flying in panic at the first firing by the police. Finding his revolution a miserable failure, Emmet hid himself in the Wicklow mountains, intending to escape to the continent, but he delayed long enough to have an interview with the daughter of Curran, the famous advocate, with whom he was in love, and this delay led to his arrest. He was tried for treason, convicted, and executed Sept. 20, 1803. His speech, on being asked why sentence should not be pronounced, has long been held up as a model of patriotic eloquence.

EMMET, THOMAS ADDIS, LL.D. 1764–1827; b. Cork; brother of Robert. He was educated in Trinity college, Dublin, and studied medicine in Edinburgh, and visited the medical schools of the continent. In 1788, he gave up medicine, and took to the study

of law, being admitted to the Dublin bar in 1790. He was involved as counsel and as leader of the United Irishmen, and in Mar., 1798, he, with others, was arrested. He was kept a prisoner until June, 1802, and then received freedom on agreeing to leave the country. He went to Hamburg and to Brussels, and, in 1803, to France, where he had an interview with Napoleon, who was at that time contemplating an invasion of England. In 1804, he came to New York, where he soon gained a large law practice, and received much attention as a political exile. In 1812, he was attorney-general of New York state, but served only six months.

EMMETT, a co. in n. Iowa, on the border of Minnesota; 432 sq.m.; pop. '75, 1436. It is undulating, with fertile soil, and contains a number of small lakes. Co. seat, Estherville.

EMMETT, a co. in n. Michigan, in the peninsula bordering on Mackinaw straits and lake Michigan, traversed by the Grand Rapids and Indiana railroad; 430 sq.m.; pop. '74, 1272. The surface is undulating and the soil fertile, mostly of prairie; productions agricultural. Co. seat, Little Traverse.

EMMITTSBURG, or EMMETTSBURG, a village in Frederick co., Md., 61 m. n.w. of Baltimore, by the Western Maryland railroad, and 10 m. s.w. of Gettysburg, Penn. It is noted principally as the seat of Mount St. Mary's college, the largest Roman Catholic educational institution in the United States, established in 1809. Near by is St. Joseph's academy, the mother-house of the sisters of charity in this country. The village has about 800 inhabitants, besides students.

EMMONS, EBENEZER, 1799-1863; b. Mass.; professor of natural history in Williams college, 1833, and of chemistry in Albany medical college, 1838. In 1836, he was one of the commission to make a geological survey of New York, and in 1856, became state geologist of North Carolina. He wrote text books and reports on mineralogy and geology.

EMMONS, GEORGE F., b. Vt., 1811; midshipman 1828, and rose to rear-admiral in 1872. He was in the Wilkes exploring expedition, and off the Mexican coast during the war with that country. In the war of the rebellion he commanded blockading vessels, and was in Dahlgren's fleet; and from 1864 to the close of the war, he commanded a division of the blockading fleet in the gulf of Mexico.

EMMONS, NATHANAEL, D.D., was b. at East Haddam, Conn., in 1745, and graduated with honor at Yale college, in 1767. He began his theological studies with Rev. Nathan Strong, of Coventry, Conn., and continued them with Dr. John Smalley, of Berlin, Conn., who had been a pupil of Bellamy. In 1773, he was ordained pastor of the Congregational church in Franklin, Mass., and continued in the office 54 years. In this church, during and after his pastorate, he rejoiced over five revivals of religion, and received into communion about 400 persons who, almost without exception, were through life consistent Christians. He superintended the studies of nearly 100 young men in preparation for the ministry, many of whom became strong and useful preachers; some of them were distinguished as professors in colleges and theological seminaries; and about 50 have a place in published accounts of eminent men. He was one of the originators of the Mass. missionary society, and one of the editors of its missionary magazine from which the *Missionary Herald* grew. When masonry was popular he zealously opposed it; when the anti-slavery movement was denounced he actively favored it. He was a decided "Federalist," and caused great excitement by his political writings. As an author and preacher he exerted a very great influence on the churches. During his life he published 4 elaborate dissertations, more than 100 magazine articles, and about 200 sermons, of which 7,000 copies were issued. He preached about 6,000 times. At his death a part of his sermons was published in 7 octavo volumes, and a new edition, enlarged, in 6 volumes. About 75 years of his life were spent in earnest and systematic study, during the greater part of which time he read and wrote 10, 12, and sometimes 14 hours a day. He has been described by those who knew him well as "methodical, temperate, regular in his habits, distinguished for punctuality, precision and sharpness of mind, keen analysis, self-consistency, wit, frankness, honesty, and reverence for the truth. As a Calvinist he wished to be considered neither "high" nor "low," but consistent. On one Sabbath he would present the doctrine of divine sovereignty with such strength that some might think him a fatalist; the next Sabbath he would advocate free will so powerfully that some might call him a Pelagian; and in a third sermon he would lay out his strength in showing that the sovereignty of God was not inconsistent with the free-agency of man. He steadily adhered to old usages and wore the antique dress and three-cornered hat as long as he appeared in public. He lived to his 96th year, retaining the strength of his faculties to the last, and died with an unfaltering faith in Christ.

EMOLLIENTS (from Lat. *mollis*, soft), substances used to soften the textures to which they are applied, as poultices, fomentations, etc., externally, and demulcents (q.v.), internally.

EMORY, JOHN, D.D., 1789-1835; b. Md.; brought up to the law, but became a Methodist preacher in 1810. In 1820, he was a delegate to the British Wesleyan conference; in 1824, book agent of his church at New York, and in 1832, was chosen bishop. He

wrote *The Divinity of Christ Vindicated; Defense of our Fathers;* and other works on religious subjects.

EMORY, ROBERT, D.D., 1814–48; son of John; president of Dickinson college; author of a life of his father, and *History of the Discipline of the Methodist Episcopal Church.*

EMORY, WILLIAM H., b. Md., 1811; a graduate of West Point; in 1863, col. of cavalry, and in 1865, maj.gen. of volunteers. He served with credit in the war of the rebellion.

EMOTION. This is the name for one of the comprehensive departments of the human mind. It is now usual to make a threefold division of the mind—E., or feeling; volition, or action prompted by feelings; and intellect, or thought. It is not meant that these can be manifested in absolute separation; or that we can be at one time all E., another time all volition, and again all thought, without either of the other two. But although our living mind is usually a concurrence, in greater or less degree, of all of them, still they can be distinguished as presenting very different appearances, according as one or other predominates. Wonder, anger, fear, affection, are emotions; the acts that we perform to procure pleasurable feelings, and avoid painful, are volitions, or exercises of will; memory and reasoning are processes of thought, or intellect.

E. is essentially a condition of the waking, conscious mind. When asleep, or in a faint, or in any of those states called "being unconscious," we have no E.; to say that we have would be a contradiction, which shows that "emotion" is a very wide and comprehensive word. In fact, whenever we are mentally excited "anyhow," we may be said to be under emotion. Our active movements and intellectual processes can sometimes go on with very little consciousness; we may walk and scarcely be aware of it; trains of thought may be proved to have passed through the mind while we are unconscious of them. Now, it is these unconscious modes of volition and intellect that present the greatest contrast to E.; showing how nearly co-extensive this word is with mental wakefulness, or consciousness, in its widest signification.

E., then, is of the very essence of mind, although not expressing the whole of mind. There are three distinct kinds or divisions of it: pleasures, pains, and excitement that is neither pleasurable nor painful.

Every kind of pleasure is included under E. in its widest acceptation. The pleasures of the senses are as much of an emotional character as those pleasures that are not of the senses—as, for example, those of power, pride, affection, malevolence, knowledge, fine art, etc. Every one of our senses may be made to yield pleasurable E.; and all those other susceptibilities, sometimes called the special emotions, of which a classification is given below, are connected with our pleasures or our pains. What pleasure is in its inmost nature, each one must find from his own experience; it is an ultimate fact of the human consciousness which cannot be resolved into anything more fundamental, although, as will be seen, we can lay down the laws that connect it with the other manifestations of mind—namely, action and thought, and with the facts of our corporeal life.

In the next place, pain is a species of emotion. We know this condition as being the opposite of pleasure, as the source of activity directed to its removal or abatement, and as the cause of a peculiar outward appearance, known as the expression or physiognomy of pain. All the inlets of pleasure are also inlets of pain. The various sensibilities of the mind, whether the outward senses, or the more inward emotions, give rise at one time to pleasure, at other times to pain, the conditions of each being generally well understood by us; we can define the agencies that cause pleasure or suffering through the skin, the ear, or the eye.

But it is requisite, further, to recognize certain modes of neutral excitement, in order to exhaust the compass of emotion. We are very often roused, shocked, excited, or made mentally alive, when we can hardly say that we are either pleased or put to pain. The mind is awakened and engrossed with some one thing, other things are excluded; and the particular cause of the excitement is impressed upon us so as to be afterwards remembered, while all the time we are removed alike from enjoyment and from suffering. This is a kind of E. that has its principal value in the sphere of intellect. The E. of wonder or astonishment is not seldom of this nature; for although we sometimes derive pleasure, and sometimes the opposite, from a shock of surprise, we are very frequently affected in neither way, being simply *impressed.* The strange appearance of a comet gives far more of this neutral effect than of the others. It is a thing that possesses our mind at the time, and is afterwards vividly remembered by us, and these are the chief consequences of its having roused our wonder.

The physical accompaniments of E. are a part of its nature. It has been remarked in all ages, that every strong passion has a certain outward expression or embodiment, which is the token of its presence to the beholder. The child soon learns to interpret the signs of feeling. Joy, grief, affection, fear, rage, wonder, have each a characteristic expression; and painters, sculptors, and poets, have adopted the demeanor of passion as a subject for their art. There must be some deep connection in the human

frame between the inward states of consciousness and the physical or corporeal activities, to produce results so uniform throughout the human race. When we study the facts closely, we obtain decisive proof of the concurrence of the following members and organs in the manifestation of feeling.

In the first place, the *muscles* or *moving organs* are affected. Under strong excitement, the whole body is animated to gesticulation; in less powerful feelings, the expression confines itself more to the *features* or the movements of the face. These last have been analyzed by sir Charles Bell. The face has three centers of movement—the mouth, eyes, and nose; the mouth being most susceptible, and therefore the most expressive feature. In the eyes, expression is constituted by the two opposite movements of the eyebrows; the one raising and arching them (prompted by a muscle of the scalp, *occipito-frontalis*), the other corrugating and wrinkling them. The one movement is associated with pleasing states, the other with painful. The nose is acted on by several muscles, the most considerable of which is one that raises the wing together with the upper lip, and is brought into play under the disgust of a bad smell and in expressing dislike generally. The mouth is principally made up of one ring-like muscle (*orbicularis*), from which nine pairs radiate to the cheeks and face. In pleasing emotions, the mouth is drawn out by the action of two pairs of muscles, named the buccinator and zygomatic, situated in the cheek. The expression of pain is determined by the contraction of the aperture of the mouth, through the relaxation of those muscles, and the contraction of the ring-like muscle that constitutes the flesh of the lips; and by two muscles in the chin, one depressing the angle of the mouth, and the other raising the middle of the lower lip, as in pouting. Besides the features, the voice is instinctively affected under strong feelings; the shouts of hilarious excitement, the cry of sharp pain, and the moan of protracted agony, are universally known. Another important muscle of expression is the diaphragm, or midriff, a large muscle dividing the chest from the abdomen, and regularly operating in expiration. In laughter, this muscle is affected to convulsion.

In the second place, the *organic functions* of the system are decidedly influenced for good or evil under emotion. The glandular and other organs acted on in this way comprehend the most important viscera of the body. The lachrymal secretion is specifically affected under passion; the flow of tears being accelerated to a rush, instead of pursuing the tranquil course of keeping the eyeball moist and clean. The states of the sexual organs are connected with the strongest feelings of the mind, being both the cause and the effect of mental excitement. The digestion is greatly subject to the feelings, being promoted by joy and hilarity, not in too great excess, and arrested and disturbed under pain, grief, terror, anger, and intense bodily or mental occupation. The skin is known to respond to the condition of the mind; the cold sweat in fear is a derangement of its healthy functions. The respiration may be quickened or depressed according to the feelings. The action of the heart and the circulation of the blood are subject to the same causes. The nature of this influence was explained under BLUSHING. Lastly, in women, the lacteal secretion participates in the states of E., being abundant, healthy, and a source of pleasure in a tranquil condition of mind, while grief and strong passions change it to a deleterious quality.

The connection between mental E. and bodily states being thus a fact confirmed by the universal experience of mankind, can we explain this connection upon any general law or principle of the human constitution? Have we any clue to the mysterious selection of some actions as expressing pleasure, and others as expressing pain? The reply is, that there is one principle or clue that unravels much of the complexity of this subject—namely, that *states of pleasure are usually accompanied with an increase in some or all of the vital functions, and states of pain with a depression or weakening of vital functions.* This position may be maintained on a very wide induction of facts, many of them very generally recognized, and others open to any careful observer; there being, however, some appearances of an opposite kind, which have to be satisfactorily accounted for, before we can consider it as fully established.

If we consider first the respective *agents* or causes of pleasure and pain, we must acknowledge that they are very generally of a nature to accord with the view now stated. How many of the sources of pleasure are obviously sources of increased energy of some vital organs. The case of food is too obvious to need any comment. Warmth within limits both confers pleasure and stimulates the skin, the digestion, and other functions. Fresh air exhilarates the mind, while quickening the respiratory function. Light is believed to stimulate the vital actions no less than the mental tone. And if there be some pleasures of sense, such as mere sweetness of taste, fragrant odors, music, etc., that do not obviously involve greater energy of vital function, they might be seen to do so, if we knew more than we do respecting the operation of the various organs, and we are certain that they do not have the opposite effect. Medical authorities are so much impressed with the general tendency of pleasures, that they include them in the list of *stimulants* in cases of low vitality. If we pass from the senses to the special emotions, such as wonder, power, tender affection, taste, we find that when those are pleasing, they also increase the animal forces at some point or other. A stroke of victory sends a thrill through the whole system; and if the pulse were examined at that moment, we should find that it beats stronger. The illustration for pains is exactly parallel, but still more striking. It is notorious that hurts, wounds, fatigue, ill-health, hunger, chillness,

nauseous tastes and odors, the silence of a prison, the gloom of utter darkness, failure, humiliation, contumely, deprivation of one's usual comforts and pleasures—while causing pain, cause in a corresponding degree a depression of the powers of the system. There are some apparent exceptions, as in the stimulus of the whip, the bracing agency of cold, and the effect of misery generally in rousing men from lethargy to action, but these could all be shown to be quite compatible with the main principle.

If we turn from the agents to the *expression*, or modes of manifestation, of the opposing mental conditions, we shall find that the facts are of the same general tenor, although with some seeming exceptions. Joy makes a man spontaneously active, erect, animated, and energetic. It is as if a flush of power were diffused through his members; and the efforts he is then prompted to, lead to no painful exhaustion. The opening up of the features, by the elevation of the eyebrows and the retraction of the mouth, indicates that the stream of energy has coursed over the face. In a still greater shock, the convulsiveness of laughter, by which respiration is quickened, attests the superabundance of the animal spirits. The body stands more erect, and every act done is done with more emphasis. Grief and depression are the opposite in every particular. The frame is languid and stooping, the features lifeless, the voice is a feeble wail; and although there is a species of convulsion attending on this condition of mind, it is a marked contrast to the other. The sob is caused by the *partial paralysis* of the diaphraghm, which necessitates great voluntary efforts in order that the breathing may proceed. The choking sensation at the throat is also a species of paralysis from loss of vital power. The convulsions arising under such circumstances are productive of an exhausting reaction, which is the case with all the energetic movements stimulated by extreme action.

Such is undoubtedly the general fact. But why should pain stimulate, or give strength to, *some special* muscles, such as the corrugator of the eyebrow, and the depressor of the angle of the mouth? This has appeared a great difficulty to the ablest physiologists. It would look as if pleasure coincided with an energetic wave sent to some muscles, and pain with an energetic wave sent to others; so that the opposite conditions of mind are equally accompanied by an accession of power to some bodily member. But if we examine the matter more narrowly, it will probably turn out that the muscles that seem to be stimulated under pain, are not so in reality, but obtain the upper hand through the general relaxation of the system. Thus, take the mouth. We know the state of the mouth in languor, inaction, and sleep. We know that when we are roused in any way, the muscles of the face operate and draw the mouth asunder in a variety of forms. Pleasure corresponds with our energetic moods, pain causes a collapse towards the sleepy and exhausted condition which represents a state of departed energy. So the collapse of the body might seem an exertion of the *flexor* muscles, or those that bend the frame forward; but we are well aware that such collapse takes place when the system is totally lifeless. A renewed energy, as a matter of course, makes us stand erect.

This is a part of the case in reply to the objections arising from a specific expression of pain, but not the whole; and the answer to the difficulties still remaining is furnished by a fact that, if well authenticated, will probably dispose of nearly all the exceptions to the general principle now contended for. It is the organic functions, *more than the muscular system*, whose increased vitality coincides with pleasurable feeling, and their diminished action with pain. Muscular exercise is often highly agreeable, but the pleasure of *resting* after exercise is still more so. Now, there can be little doubt that what happens in the state of healthy repose is this: the amount of vital force stimulated by exercise—the increased energy derived from plying the lungs and heart—is now allowed to leave the active members, and to pass to the other organs—the digestion, skin, and various secreting glands—and it is their aggandizement that is associated with the comfortable sensations of repose and sinking into sleep. Thus, the abating of muscular energy may be a cause of pleasure, provided the organic functions are raised in consequence; but it may be maintained as a highly probable supposition, that a certain health and energy of some or all of these functions (it is difficult to draw a specific line) is essential to pleasurable feeling. We may doubt whether even mental causes can materially raise the tone of enjoyment, if they do not also raise the activity of some of these organs. Not only may a person be very happy and comfortable in the prostration of the muscular energy, even in a sick bed, but one way of procuring comfort is to induce a total inaction of the moving members, to allow all the available nervous power to pass to the viscera and secretions. Hence a *forced relaxation* of the muscles *generally*, by the employment of *some* of them, is a means of soothing the mind under pain. Thus, the active intervention of certain small muscles—such as the corrugator of the eyebrows, the orbicular muscle of the mouth, and the depressor of the angle of the mouth—by relaxing a much greater body of muscle, is the means of setting free vital energy for behoof of the other parts of the system. This would explain the mental relief furnished by an assumed sadness of feature, and a voluntary collapse of the body generally.

It would appear, then, that the stimulus of muscle is not necessarily or immediately a cause of pleasure; while the stimulus of the organic functions is so. Thus, a bracing cold quickens the activities, but is apt to cause a shock of pain, by temporarily checking the action of the skin; when the reaction arrives, this check is converted into stimula-

tion, and the mental state is altered in like manner. A bitter tonic must be supposed to act on the same principle.

The emotions of the human mind may be classified under two heads:

First—The pleasures, and pains, and modes of excitement growing out of the exercise of the senses, the movements, and the appetites. See SENSES. The five senses, commonly recognized, are partly sources of pleasure and pain, in which case they yield emotion, and partly sources of knowledge, by which they are related to the intellect. There are other sensibilities not included in the five senses, but ranking with them in those particulars—as the feelings of muscular exercise and repose, and the sensations of digestion, respiration, etc.

The second head comprises the special emotions not arising immediately out of sensation, although connected therewith. These have been variously classified. The following is one mode of laying them out: 1. Feelings of liberty and restraint; 2. Wonder; 3. Terror; 4. Tender affections; 5. Emotions of self-complacency, love of approbation, etc.; 6. Sentiment of power; 7. Irascibility; 8. Emotions of action, including the interest of pursuit or plot; 9. Emotions of intellect, love of knowledge, consistency, and Inconsistency; 10. Fine art emotions, or taste; 11. The moral sense.

On this subject, see Müller's *Physiology, Movements due to the Passions of the Mind;* Bell's *Anatomy of Expression;* Stewart on the *Active Power;* Bain on the *Emotions and the Will,* etc.

EMPANEL.—*Empanellare vel ponere in assisis et juratis*—to write in a schedule or roll the names of such jurors as the sheriff returns to pass upon any trial. The judges of assize in England, before commencing their circuits, issue precepts to the sheriffs of the several counties, calling upon them to summon a sufficient number of jurors to serve upon the grand and petty juries. In compliance with this order, the sheriff prepares lists, called the panels (q.v.) of the jury, and the persons named in the lists are thereupon summoned to attend at the assizes.

EMPECINA'DO, DON JUAN MARTIN DIAZ, EL, one of the leaders of the Spanish revolution of 1820, was b. in 1775. He was the son of poor parents, and entered the Spanish army in 1792. At the head of 5,000 or 6,000 men, he carried on a guerilla warfare against the French during the Peninsular struggle, and acquired great distinction. In 1814, he was appointed col. in the regular army, and the king himself created him field-marshal; but in consequence of petitioning Ferdinand, in 1815, to reinstitute the cortes, he was imprisoned, and afterward banished to Valladolid. On the outbreak of the insurrection in 1820, he took a prominent part on the side of the constitutionalists, and on several occasions exhibited great courage, daring, and circumspection. After the triumph of the absolutists in 1825, he was arrested, exposed in an iron cage to the contumely of the passers-by, and finally executed on a common gibbet, amidst the ferocious yellings of a debased and liberty-hating populace.

EMPED'OCLES, a Greek philosopher of Agrigentum, in Sicily, lived about 450 B.C. So great was the estimation in which he was held by his fellow-citizens as a physician, a friend of the gods, a predicter of futurity, and a sorcerer, or conjuror of nature, that they are said to have offered him the sovereignty. But being an enemy of tyranny, he declined it, and was the means of delivering the community from the dominion of the aristocracy, and bringing in a democracy. There was a tradition that he threw himself into the crater of Etna, in order that his sudden disappearance might beget a belief in his divine origin; this, however, can only be regarded as a mere fable, like the story told by Lucian, that Etna threw out the sandals of the vain philosopher, and thus destroyed the popular belief in his divinity. The statement of Aristotle is, that he died at the age of 60; later writers extend the period of his life considerably further, but their testimony is not equal in weight to that of Aristotle.

In E., philosophic thought is bound up with poetry and myth even in a higher degree than in Parmenides (q.v.). His general point of view is determined by the influence of the eleatic school upon the physical theories of the Ionic philosophers. He assumed four primitive independent substances—air, water, fire, and earth, which he designates often by the mythical names Zeus, Here, etc. These four *elements,* as they were called, kept their place till modern chemistry dislodged them. Along with material elements, he affirmed the existence of two moving and operating powers, love and hate, or friendship and strife, the first as the uniting principle, the second as the separating. The contrast between matter and power, or force, is thus brought out more strongly by E. than by previous philosophers. The origin of the world, or cosmos, he conceived in this way: In the beginning, the elements were held in a sort of blended unity, or *sphere,* by the attractive force of love; when hate, previously exterior, penetrated as a repelling and separating principle. In this process of separation, which gives rise to the individual objects of nature, he seems to have assumed a series of stages, a gradual development of the perfect out of the imperfect, and a periodical return of things to the elemental state, in order to be again separated, and a new world of phenomena formed. From the fragments that we possess of his didactic poem, it is not quite clear in how far he considered fire as the substratum of strife, and water as the substratum of love, and ascribed various creations to the predominance of one or the other of these principles. Of his opinions on special phenomena, may be mentioned his

doctrine of emanations, which proceeding from one thing enter into corresponding openings in other things. By this assumption in connection with the maxim, that like is known only by like, he thought to explain the nature of perception by the senses. He attempted to give a moral application to the old doctrine of the transmigration of souls, his views of which resembled those of Pythagoras. The fragments of E. have been edited by Sturz (2 vols., Leip. 1805), Karsten (Amst. 1838), and Stein (Bonn, 1852).

EMPEROR (Lat. *imperator*). The original signification of this, which in the modern world has become the highest title of sovereignty, can be understood only when it is taken in conjunction with *imperium*, which in the Roman political system had a peculiar and somewhat technical meaning. The imperium of a magistrate, be he king or consul, was the power which he possessed of bringing physical force into operation for the fulfillment of his behests. This power was conferred by a *lex curiata*, and it required this authorization to entitle a consul to act as the commander of an army. In the case of the kings also, the imperium was not implied in their election, but was conferred separately, by a separate act of the national will. "On the death of king Pompilius," says Cicero, "the *populus* in the *comitia curiata* elected Tullus Hostilius king, upon the rogation of an *interrex;* and the king, following the example of Pompilius, took the votes of the *populus*, according to their *curiæ, on the question of his imperium.*"—*Republic*, ii. 17. Now, it was in virtue of this imperium that the title imperator was given to its possessor. Far from being an emperor in the modern sense, he might be a consul or a pro-consul; and there were, in fact, many imperatores, even after the title had been assumed as a prenomen by Julius Cæsar. It was this assumption which gradually gave to the title its modern signification. In republican times, it had followed the name, and indicated simply that its possessor was *an* imperator, or one possessed of the imperium; now it preceded it, and signified that he who arrogated it to himself was *the* emperor. In this form it appears on the coins of the successors of Julius. After the times of the Antonines, the title grew into use as expressing the possessor of the sovereignty of the Roman world, in which sense *princeps* also was frequently employed. In the introduction to the *Institutes*, Justinian uses both, in speaking of himself, in the same paragraph. From the emperors of the west, the title passed to Charlemagne, the founder of the German empire. When the Carlovingian family expired in the German branch, the imperial crown became elective, and continued to be so till it ceased—Francis II., who in 1804 had declared himself hereditary emperor of Austria, having laid it down in 1806. In addition to the emperor of Austria, there are now in Europe the emperor of Russia and emperor of Germany, the latter of whom, was, on Jan. 18, 1871, proclaimed under this title within the hall of mirrors, in the palace of the French kings at Versailles, in the presence of the German princes, and the standards of the German army which was beleaguering Paris. In 1876 the queen of England assumed the title of empress of India, in addition to those which she bore previously.

EMPEROR MOTH, *Saturnia pavonia minor*, a moth of the same family (*bombycidæ*) with the silk-worm moth. The E. M. is the largest British lepidopterous insect. Its expanse of wings is about 3½ inches. Each wing is ornamented with a large eye-like glassy and transparent spot. The peacock moth (*S. pavonia major*) is the largest European species, and attains an expanse of 5 in. across the wings. The cocoons of the E. M. are remarkable for being formed internally of stiff convergent elastic threads, which readily permit the escape of the insect, but prevent the entrance of intruders. The cocoons of this genus of moths are invested with silk, which in China and India is collected for use. See SILK AND SILK-WORM.

EMPETRA'CEÆ. See CROWBERRY.

EMPHASIS. See ACCENT.

EMPHYSE'MA, an unnatural distension of a part with air. E. of the cellular texture often takes place in the neighborhood of wounds of the air-passages in the lungs, and is the consequence of an escape of air from these parts. E. of the lungs is the consequence either of distension or of rupture of the air-vesicles, especially on the surface. It is rarely that E. is produced otherwise than mechanically; but collections of fluid in a state of decomposition sometimes give out gases, which penetrate and distend the textures with which they are in contact.

EMPHYTEU'SIS (Gr. an implanting), in the Roman law, a perpetual right in a piece of land, for which a yearly sum was paid to the superior or original proprietor. The E. much resembled our feudal holdings, so much so, indeed, that Craig and other Scotch writers apply the term to them. The sum paid to the superior was called the *canon emphyteuticus*. The tenant handed down the right to his heirs, and was entitled to sell, but only on condition of giving the first offer to the dominus. The consent of the lord, however, was not necessary to entitle him to impignorate the emphyteuta for his debt. Justinian put the E. and the *ager vectigalis* on the same footing. The latter is the term applied to lands leased by the Roman state, by towns, ecclesiastical corporations, and by the vestal virgins. There were several ways in which the right of E. might cease. If the tenant died without heirs, it reverted to the dominus. He might also lose his right by injuring the property, by non-payment of his rent or public burdens, or by

alienation without notice to the dominus. It was, of course, also in his power to renounce it.

EMPIRE, EMPEROR (*ante*), denotes the territory and people whose sovereign bears the title of emperor or empress; a title which, since the time of Julius Cæsar, implies the possession of monarchial power in its highest form. During the middle ages and until a comparatively recent period the "Empire" in its strictest sense meant the "holy Roman empire" founded by Cæsar and Augustus, the last remnant of which was lost in 1806, when Francis II. of Hapsburg, archduke of Austria and king of Hungary and Bohemia, resigned his inherited imperial title and assumed that of emperor of Austria alone. The Roman empire, from A.D. 395, was divided into two parts, one of which was ruled from Rome, the other from Constantinople. In theory, however, the two were held to be parts of one empire, divided only for greater convenience of administration. This was fiction rather than fact, for the two parts were in perpetual conflict. An attempt to restore the unity of the two under Charlemagne, who in 800 was crowned emperor at Rome by pope Leo III., proved abortive. Two hostile lines of emperors arose, each claiming to be the one true succession from Augustus and Constantine. The imperial title fell low, until it was revived in the w. in 962 by Otto the great, from whose time there was an unbroken succession of German kings, who assumed the rank and right of emperors and were acknowledged as such by the church. Their power, however, did not extend beyond Germany and northern Italy, and it was hampered by many restrictions, which were aggravated as time went on, until after the peace of Westphalia, in 1648, when the empire was reduced to a mere federation of principalities and the imperial title became little better than a farce. The eastern empire was overthrown in 1453, when Constantinople was taken by the Turks. The empires now existing are those of Austria, Russia, Germany, Turkey, China, and Japan. The queen of England bears the title of empress of India.

EMPIR'IC (Gr. *empeirikos*, an experimentalist, or searcher after facts in nature, from *peirao*, I try). It is difficult to say at what period, or in what manner, this word began to degenerate from its original meaning. Probably the idea was, that empiricism, or experimental science, excluded, because it did not require, the reasoning faculties for its cultivation; and, therefore, the profession of empiricism came to be synonymous with vulgar ignorance. The empirics were a regular sect of ancient physicians in the time of Celsus and Galen, who give us some insight into their modes of thought and practice. They laid great stress on the unprejudiced observation of nature; and thought that, by a careful collection of observed facts forming a history, the coincidence of many observations would lead to unalterable prescriptions for certain cases. The later adherents of the school excluded all theoretical study, even that of anatomy, and were guided solely by tradition and their individual experience. By an E. in medicine is now understood a man who, from want of theoretic knowledge, prescribes remedies by guess according to the name of the disease or to individual symptoms, without thinking of the constitution of the patient or other modifying circumstances. What are called *specifics* are administered on this principle, or want of principle.

EMPIR'ICAL FORMULA, in chemistry, is the mode of expressing the constituents of a compound in symbols, where the total quantity of each element is written down without reference to any particular order or state of combination. Thus, alcohol consists of 4 equivalents of carbon, 6 of hydrogen, and 2 of oxygen; and its E. F. is $C_4H_6O_2$. When regarded, however, as a member of a family group, the constituents are arranged in a more systematic manner, as in C_4H_5O,HO, representing the theoretical constitution of alcohol, which, strictly speaking, is the hydrated oxide of ethyl. Again, the rational formula of Epsom salts, which is $MgOSO_3+7HO$, represents it theoretically as a hydrated sulphate of magnesia; while the E. F. MgH_7SO_{11} merely tells us that it consists of 1 equivalent of magnesium (Mg), 1 of sulphur (S), 7 equivalents of hydrogen, and 11 of oxygen. (Old notation.)

EMPIRICAL LAWS are such as express relationships, which may be merely accidental, observed to subsist among phenomena, but which do not suggest or imply the explanation or cause of the production of the phenomena. They are usually tentative, and form stages in the progress of discovery of causal laws. Bode's law of the distances of the planets from the sun may be accepted as an example of an empirical law.

EM'POLI, a t. of Italy, is situated in the province of Florence, in a remarkably beautiful and fertile district on the left bank of the Arno, 16 m. w.s.w. of Florence. It is a thriving town, is surrounded by walls flanked with towers, and although its streets are narrow, it is on the whole well built, and has some good squares. The most interesting building is the Collegiate church, built in 1093, the fine original façade of which has suffered but little from modern *improvements*, although the other portions of the building were considerably altered in 1738. This church contains several good paintings, and has also some excellent specimens of sculpture, among which is one by Donatello. E. has several manufactories of cotton, leather, straw-hats, and glass, a considerable trade in agricultural produce, and a weekly market of some importance. Pop. 6,500.

EMPO'RIUM (Gr. *emporion*, trading-place). The word is derived from *emporos*, which signified in Homer's time a person who sailed in a ship belonging to another, but latterly meant a wholesale merchant, as opposed to a retailer, who was called *kapēlos*. An E. thus came to be applied to the receptacles in which wholesale merchants stowed their goods in seaports and elsewhere, and thus corresponded to our warehouses, as opposed to a shop.

EMP'TION. See SALE OF GOODS.

EMPYE'MA (Gr.), an internal suppuration, a word now applied exclusively to a collection of pus in the pleura, causing pressure of the lung, and often attended by hectic fever. See PLEURISY.

EMPYREU'MA (Gr. *empyreuo*, I kindle), the burned smell and acrid taste which result when vegetable or animal substances are decomposed by a strong heat. The cause of the smell and taste resides in an oil called *empyreumatic*, which does not exist naturally in the substance, but is formed by its decomposition.

EMS, a river in the n.w. of Germany, rises in Westphalia, at the southern base of the Teutoburger Wald, and flowing first in a north-western, and then through the Hanoverian territories in a northern direction, empties itself into Dollart bay, an estuary of the German ocean, after a course of 250 miles. Its chief affluents are the Aa, the Haase, and the Leda. It is navigable for vessels of 100 tons as high as Pappenburg, which is 25 m. up the river from Dollart bay. The E. drains a basin of about 5,000 sq. m. in extent. In 1818, it was connected by a canal with the Lippe, and thus with the Rhine, which greatly increased its importance with respect to commerce and navigation.

EMS, usually called the *Baths of Ems*, to distinguish it from other places of the same name, a bathing-place known to the Romans, and celebrated in Germany as early as the 14th century. It is situated about 4 m. from Coblenz, near the most picturesque parts of the Rhine, in a beautiful valley in the province of Hessen-Nassau, traversed by the navigable river Lahn, and surrounded by wooded hills. Pop. '75, 6,104. Its warm mineral springs belong to the class containing soda; the only essential difference between the numerous springs is in the temperature varying from 24° to 46° Reaumur, and in the greater or lesser amount of carbonic acid gas contained in them. The bathing establishments are comfortably and luxuriously fitted up, as are also the hotels and private lodging-houses.

EMSER, HIERONYMUS, 1477–1527; a Roman Catholic theologian of Germany, distinguished as an opponent of Martin Luther. His most notable exploit was the publishing of a translation of the New Testament which he claimed as his own work, though it was really a reprint of Luther's translation with some slight alterations.

E'MU (*Dromaius*—or *dromecius*—*Novæ Hollandiæ*), a very large bird, one of the *struthionidæ* or *brevipennes*, a native of Australia, and widely diffused over the southern parts of that continent and the adjacent islands. It is by some ornithologists referred to the same genus with the cassowary, but the differences are very considerable; the bill being horizontally depressed, whilst that of the cassowary is laterally compressed, the head feathered, and destitute of bony crest; the throat is nearly naked, and has no pendent wattles; the feet are three-toed as in the cassowary, but the claws are nearly of equal length. The name E. or emeu was given by the older voyagers and naturalists to the cassowary, but is now the invariable designation of the Australian bird. The E. is even taller than the cassowary, which it resembles in the general character of its plumage. Its wings are mere rudiments hidden beneath the feathers of the body. Its color is a dull brown, mottled with dingy gray; the young are striped with black. When assailed, it strikes backwards and obliquely with its feet, like the cassowary, and it is so powerful that a stroke of its foot is said to be sufficient to break a man's leg. Dogs employed in hunting it are often injured by its kicks, but well-trained dogs run in before it, and spring at its neck. It cannot fly, but runs very fleetly. It is timid and peaceful, and trusts altogether to its speed for safety, unless hard pressed. In a wild state, it sometimes occurs in small flocks; but it has now become rare in and around all the settled parts of Australia. The extinction of the species may, however, perhaps be prevented by its being preserved in a state of domestication; as its flesh is excellent, and it is very easily domesticated, and breeds readily in that state. It has frequently bred in Britain. The eggs are six or seven in number, dark green; the male performs the principal part of the incubation. The eggs are highly esteemed as food. The skin of the E. contains much oil—six or seven quarts are obtained from a single bird, and on this account it has been much hunted in Australia. The food of the E. consists chiefly of roots, fruits, and herbage. Its only note is a drumming sound, which it frequently emits.

EMUL'SINE, or SYNAPTASE, is a peculiar ferment present in the bitter and sweet almond, and which forms a constituent of all almond emulsions. When bitter almonds are bruised, and water added, the E. acts as a ferment on the amygdalin, and decomposes the latter into volatile oil of bitter almonds, prussic acid, grape-sugar, formic acid, and water (see ALMONDS, VOLATILE OIL, or ESSENTIAL OIL OF). The vegetable albumen of almonds is almost entirely composed of E.; which, when separated, is a white substance, soluble in water, and is distinguished by its remarkable power of

causing the fermentation of amygdalin. It consists of carbon, hydrogen, nitrogen, and oxygen.

EMULSION is the term applied to those preparations in pharmacy obtained by triturating certain substances with water, and where the product is a milky white opaque mixture of a gummy consistence, and composed more or less of oily particles floating in mechanical suspension in the mucilaginous liquid. The *true* and *oily* emulsions are those containing true oil, as the E. of bitter almonds, obtained by bruising the latter in a mortar with water; and the *false*, or *not oily*, where no true oil is suspended, as where camphor, balsams, or resins are rubbed up with yelk of egg, mucilage, or dilute spirit of wine.

E'MYS, a genus of marsh tortoises, from which the whole family of marsh tortoises is sometimes called *emydæ*. The chelonians of this family are numerous, and widely diffused throughout the warmer parts of the world. They differ more in their habits than in their appearance and structural characters from land tortoises. Their carapace, however, is more flattened, and their feet are more expanded and webbed, so that they swim with great facility. They feed chiefly on animal food, as insects and mollusks, aquatic reptiles, and fishes, some of them even preying upon birds and mammalia which come within their reach. Two or three species of *emydæ* are natives of the s. of Europe; but two species are particularly abundant in North America, the painted tortoise (*emys picta*), and the alligator tortoise (*emysaura serpentina*). The flesh of some, as *cistudo Europœa*, is esteemed for food. This small species, about 10 in. long, an inhabitant of lakes, marshes, and muddy places in the s. and e. of Europe, is sometimes kept in ponds, and fattened for the table on lettuce-leaves, bread, etc.

ENALIOSAU'RIANS (Gr. marine lizard), an order of fossil marine saurians commencing in the carboniferous, and ending in the cretaceous periods, being most abundant in the jurassic. They have biconcave vertebræ, like those of fishes, teeth like those of crocodiles, a lizard body, and the paddles of cetaceans instead of true feet, an apparently incompatible combination. Some had long snake-like necks, and most of them were of great size, and must have been exceedingly voracious. They comprise two groups, the ichthyosaurians and simosaurians. The ichthyosaurians belong to the jurassic and cretaceous formations, while the simosaurians have been found only in the triassic. The two principal genera of the ichthyosaurians are the ichthyosaurus and the plesiosaurus, and they are the most generally known. See ICHTHYOSAURUS and PLESIOSAURUS, *ante*.

ENAMEL (Fr. *émail*, originally *esmail*, from the same root as *smelt*), the name given to vitrified substances of various composition applied to the surface of metals. Enameling is practiced (1) for purposes of utility, as in making the dial-plates of watches and clocks, coating the insides of culinary vessels, etc., when it may be considered as belonging to the useful arts; and also (2) for producing objects of ornament and beauty—artistic designs, figures, portraits, etc., when it belongs to the fine arts. Both the composition of enamels and the processes of applying them are intricate subjects, besides being in many cases kept secret by the inventors; and we can only afford space for the most general indications of their nature. The basis of all enamels is an easily fusible colorless silicate or glass, to which the desired color and the desired degree of opaqueness are imparted by mixtures of metallic oxides. The molten mass, after cooling, is reduced to a fine powder, and washed, and the moist paste is then usually spread with a spatula upon the surface of the metal; the whole is then exposed in a surface (*fired*, as it is called) till the E. is melted, when it adheres firmly to the metal. The metal most commonly used as a ground for E. is copper; but for the finest kinds of enamel-work gold and silver are also used.

Artistic or Ornamental Enameling.—This art is of great antiquity: it is proved by the remains found in Egypt to have been practiced there; from the Egyptians it passed to the Greeks, and it was extensively employed in decoration by the Romans; in the reign of Augustus, the Roman architects began to make use of colored glass in their mosaic decorations; various Roman antiquities, ornamented with E., have been dug up in Britain, and it was adopted there by the Saxons and Normans. A jewel found at Athelney, in Somersetshire, and now preserved in the Ashmolean museum at Oxford, is proved by the inscription on it to have been made by order of Alfred; and there are various figures with draperies partly composed of colored E. on the sides of the gold cup given by king John to the corporation of Lynn, in Norfolk.

Enameling has been practiced from a remote period in the east, Persia, India, and China, under a separate and distinct development; but there is nothing from which it can be inferred that the various methods were in use earlier than in Europe. As a decoration, enameling was more popular, and attained to greater perfection in the middle ages than in classic times. It was extensively practiced at Byzantium from the 4th until the 11th c., and afterwards in Italy in the Rhenish provinces, and at Limoges in the s. of France, where it was successfully followed out till a comparatively late period, in several different styles. The Byzantine and other early styles of enamel-work down to the 17th c. were generally employed in ornamenting objects connected with the service of the church, such as reliquaries, pyxes, church-candlesticks, crosiers, portable altars, the frontals of altars, etc.; the art was also greatly used in ornamenting jewelry, and

vessels made for use or display in the mansions of the rich, such as salt-cellars, coffers, ewers, plateaux, candlesticks, etc. After this period the art declined, until a new phase of it was invented in France, in which E. is used as a ground, and the figures are painted with vitrified colors on the surface of it. This is enamel-painting properly so-called, the earlier styles being more of the nature of mosaics.

Distinguished with reference to the manner of execution, enamel-work may be divided into four kinds: 1. *Cloisonée*, or inclosed, the method of the Byzantine school, in which the design is formed in a kind of metal case, generally gold or copper, and the several colors are separated by very delicate filagree gold bands, to prevent them running into each other. 2. *Champ Levé*, practiced by the early Limoges school. In this process the ornamental design, or the figures that were to be filled in with color, were cut in the metal (generally copper) to some depth; and wherever two colors met, a thin partition of the metal was left, to prevent the colors running into each other by fusion when fired. 3. Translucent E., which had its origin, and was brought to great perfection in Italy, was composed of transparent E. of every variety of color, laid in thin coatings over the design, which was incised on the metal, generally silver, the figure or figures being slightly raised in low relief, and marked with the graver, so as to allow the drawing of the contours to be seen through the ground, instead of being formed by the coarse lines of the copper, as in the early Limoges enamels. 4. Surface-painted enamels, which may be divided into two stages. The first stage, which is known as the *late Limoge* style, sprang up under Francis I. of France (1515–47). In this the practice was to cover the metal plate with a coating of dark E. for shadows, and to paint on this with white, sometimes set off with gold hatchings, sometimes having the hands and other parts of the figures completely colored. The designs were generally taken from well-known paintings or engravings of the period; and the style of the designs was strongly influenced by that of the Italian artists employed by Francis I. This style soon degenerated, and gave place to the latest or *miniature* style, which was invented before the middle of the 16th c. by Jean Toutin, a goldsmith at Chateaudun, and carried to the highest perfection by Jean Petitot, a miniature-painaer, who was born at Geneva, 1607, and afterwards resided long in England, and then in Paris. In this the plate is covered with a white opaque E., and the colors are laid on this with a hair-pencil, and fixed by firing. The paints are prepared by grinding up colored enamels with some kind of liquid, and when fused by the heat, they become incorporated with the E. of the ground. The earlier enamelers of this school occupied themselves with miniatures, snuff-boxes, and other trinkets, till the period of the French revolution, when the art fell into disuse. It was, however, revived in England early in this century; and copies of portraits and pictures on a much larger scale than the French miniatures were executed with much success by the late H. Bone, R.A., and the late Charles Muss. Works of this description possess the obvious advantage of durability; but those various qualities of texture, and the delicacy of color for which good works in oil or water-color are prized, cannot be attained in E. copies; and it is to be regretted that greater efforts are not made to turn enameling to account in the way of ornamentation, for which it is so admirably fitted, rather than in attempts at imitating works classed strictly as within the bounds of fine art, and to put in practice the older styles of enameling, particularly those denominated *champ levé* and transparent enameling.

Enameled-ware.—The liability of iron to oxidation by heat or moisture, and to corrosion even by the weakest acids, has led to many attempts to coat it with a protecting surface. Ordinary tin plate is the oldest and most familiar example of a partially successful method. Since the beginning of the present century, many attempts have been made to cover iron with a vitreous surface, and several patents have been taken for such methods of enameling. The chief difficulty in applying enamels to iron arises from the tendency of the metal to oxidize before it reaches the temperature at which the E. fuses, and to become brittle from the oxide combining with the silica of the enamel. This action being superficial, the mischief is the greater in proportion to the thinness of the iron. Therefore it is much easier to E. thick cast-iron vessels than thin vessels made of sheet-iron. A glass may be made by combining either silicic acid or boracic acid with a base; the latter fuses at a lower temperature than the former, but the glass is much dearer and not so durable as the silica glass. The enamels used for coating iron consist of a mixture of silica and borax, with various basic substances, such as soda, oxide of tin, alumina, oxide of lead, etc.

The best E. for such purposes with which we are acquainted, is that patented by C. H. Paris, and applied by Messrs. Griffiths and Browett of Birmingham. It consists of 130 parts of flint-glass powdered, 20½ parts of carbonate of soda, 12 of boracic acid. These are fused together to form a glass, then reduced to a very fine powder; the article to which they are to be applied is carefully cleaned with acid, then brushed over with gum water, and the powder dusted upon it. The gum water is merely to cause adhesion. This coating is then carefully dried, and heated just to the point at which the powdered glass will fuse, and by running together, coat the surface. The E. is generally put on in two separate layers or coatings, the first being dull gray, and the second or outer one of some brighter color. For sheet-iron hollow-ware, the latter is usually white, upon which a pattern is often printed with transfer paper by the process in use for earthenware (see POTTERY). These light enameled iron vessels, from their being practically

indestructible (except when used for cooking), are made in large numbers for use on board ships, and for colonial markets. A great variety of articles, many of them beautifully decorated in colors, such as grate-fronts, cloak-dials, panels of different kinds, tablets, and name-plates, are now executed in enameled iron at a comparatively moderate cost. It is also applied to corrugated roofing. Clarke's and other patent enamels have been successfully applied to saucepans, small cisterns, pipes, and other articles of *cast iron*. See HOLLOW-WARE.

The action of sudden heat is to expand the metal more than the E., and cause the latter to peel off. Acids find their way through minute invisible pores, which exist in the best E.; and when once they reach the iron, they rapidly spread between it and the E., and undermine and strip it off. This kind of action is curiously shown by filling an enameled vessel with a solution of sulphate of copper. The acid attacks the iron wherever pores exist, and little beads of metallic copper are deposited at all such spots; these beads go on growing until they are large enough to be very plainly seen. This is the severest test for trying the continuity of enameled surfaces, to which they can be subjected, as sulphate of copper will penetrate the glaze and body of ordinary earthenware.

ENAMEL OF TEETH. See TEETH.

ENA'RA, or ENA'RÉ, a lake of Russia in the extreme n. of Finland, is situated in lat. 68° 30′ to 69° 10′ n., and long. 27° 30′ to 28° 45′ east. It has an area of 1200 sq.m., and has numerous islands. Its superfluous waters are discharged into the Arctic ocean.

ENAR'ËA, a country of Africa, s. of Abyssinia, is situated within lat. 7° to 9° n., and long. 36° to 38° e., but its limits have not yet been definitely ascertained. It is inhabited by a portion of the Gallas tribes, who, owing to the continued communication which they keep up with Abyssinia, and also to the residence of many Mohammedan merchants among them, are much more civilized than the Gallas usually are. Their government is a hereditary and absolute monarchy. The principal rivers of E. are the Gibbe and the Dodesa. Its coffee-plantations are so extensive as to deserve the name of woods; they occur chiefly along the banks of the Gibbe. E. is remarkable for its manufactures of ornamented arms, and of cloths with embroidered borders. Besides these, it exports slaves, gold, ivory, civet, and skins, into Abyssinia. The king and a small portion of the population are Mohammedans, and it is said that native Christians have been found here. The capital is Saka, a place of considerable importance, near the river Gibbe.

ENARTHRO'SIS is the term used by anatomical writers to express the kind of joint (q.v.) which admits of the most extensive range of motion. From the mode of connection and the form of the bones in this articulation, it is commonly called the ball-and-socket joint. It occurs in the hip and shoulder joints.

ENCAMPMENT (Lat. *campus*, a plain) is a lodgment or home for soldiers in the field. There are *intrenched* camps, where an army is intended to be kept some time, protected against the enemy; *flying* camps, for brief occupation; camps of *position*, bearing relation to the strategy of the commander; and camps of *instruction*, to habituate the troops to the duties and fatigues of war.

Under CAMP has been given an account of the manner in which Roman camps were constructed. It is probable that the same general plan was adhered to until the invention of gunpowder. When cannon came to be used, however, a new arrangement of camp became necessary, to shield the army from long-range projectiles. Everything, indeed, relating to attack and defense, especially to the latter, is taken into account in chosing the locality of a camp. A healthy site, good water, security from floods, and plenty of fuel and forage, are the chief requisites in a good encampment.

The British army, when in the field, usually encamps by brigades or divisions, roads and paths being arranged before the troops arrive. The infantry, cavalry, and artillery are so placed as to defend each other in the event of a sudden attack. There is a chain of guards all round the spot; and the park of artillery is placed behind the troops. The sutlers and servants are in the rear of the camp, but not beyond the limits of the rear-guard. The tents of the infantry are ranged in rows perpendicular to the front, each row containing the tents (q.v.) for one company. The circular tents, now much used, accommodate 15 men each. The cavalry are in like manner encamped in rows; but each circular tent accommodates only twelve men. There are streets or roads between the rows of tents, of regulated width; and the officers' tents are at a given distance behind those of the men: the subalterns' tents being nearest to those of the companies to which they respectively belong. As a general rule, the line of the whole E. is made to correspond as nearly as practicable with that in which the troops are intended to engage the enemy when fighting is renewed; to which end the tents of each battalion are not allowed to occupy a greater space in front than the battalion itself would cover when in order of battle.

Under most circumstances, in modern warfare, an E. is not defended by artificial constructions; the commander seeks security for his troops in streams, marshes, difficult surface of country, and numerous advanced posts. Sometimes, however, more extensive defense-works are necessary; and then we have an example of an *intrenched*

camp, which becomes a fortified inclosure. The chief uses of such a camp are—to secure an army while covering a siege, or in winter quarters, to accommodate a corps of observation while the active army is engaged elsewhere; or to defend a position near a fortified place. Care is taken that the site is not commanded by neighboring hills. All villages are occupied, and all obstacles removed, within a distance of half a mile or a mile. The area of ground selected is large enough to contain the necessary store of arms, ammunition, food, fuel, forage, and water, and to enable the troops to maneuver. The junction of two rivers is often selected as a favorable spot. Various defense-works are constructed around or near the spot, such as continuous earth-works, redoubts, flèches, etc. The position held by the allies outside Sebastopol, during the long intervals when the cannonading was suspended, had many of the characteristics of an intrenched camp.

Camps of *instruction* may be either temporary or permanent. Of the former kind was the camp formed at Chobham in Surrey in 1853, merely for the summer months, to exercise certain regiments in evolutions. Another was formed at Shorncliffe in Kent in 1855, at first to receive troops of the foreign legion; but it has since been improved to the condition of a permanent camp. The great establishment at Aldershott is described under ALDERSHOTT CAMP. Since that article was originally written, this remarkably popular camp has been, by an ungrudging outlay of public funds, improved in all particulars, and the small agricultural village of Aldershott has grown into an important commercial town, with railway stations, hotels, market-house, handsome shops, etc. A large permanent camp has also been established in Ireland, on a plain called the Curragh of Kildare, and there is a smaller one at Colchester.

ENCAUSTIC PAINTING (Gr. *encaustikē*, infired, or fixed by fire), a manner of painting practiced by the ancients. As the name implied that fire was used in the execution, some have been led to suppose that E. P. was the same as enamel painting; but notices by Pliny and other writers show clearly that it was a species of painting in which the chief ingredient used for uniting and fixing the colors was wax dissolved by heat. Various attempts have been made in modern times to revive it. About the middle of last century, count Caylus and M. Bachelier, and in 1792, Miss Greenland, made various experiments with this view. The count laid the result of his experiments before the academies of painting and of sciences in Paris; and the ingenious lady was rewarded with a gold pallet by the society for the encouragement of arts in London; but the success of these efforts seems to have been but temporary. E. P. was, however, some years ago again taken up in Germany under the patronage of the late king of Bavaria, who had a number of important works executed in this way. The colors are ground, and laid on with a vehicle composed principally of wax. Miss Greenland dissolved gum-arabic in water, afterwards adding gum-mastic, which was dissolved by stirring and boiling, and when the mixture had reached the boiling-point, she put in the wax. After painting the picture, she passed a thin coating of melted wax over it with a hard brush, and then drew over the surface an iron—for ironing linen—moderately heated. After the picture cooled, it was rubbed with a fine linen cloth. The German method is somewhat similar, but some other ingredients are used; among these, potash with the wax; and in place of an iron being passed over the surface, the wax is brought to the surface by a vessel containing fire being held at a little distance from the picture. E. P. is not likely to come into general use, for neither in imparting brilliancy to the colors, facility for execution, nor durability, is it to be compared with oil-painting.

ENCAUSTIC TILES, ornamental tiles made of earthenware, and now extensively used for paving churches, halls, conservatories, etc. Strictly speaking, the name applies only to tiles with a pattern produced by layers of different-colored clays; but we may also include those made of a single color where two or more kinds go to form a pattern. Of course a mosaic can thus be formed with tiles of various forms as well as colors. Tiles of one color are made of dried slip—that is, the powder of carefully mixed and prepared clay. These "dry tiles" are made by placing the colored clay powder in strong steel molds, and subjecting it to a pressure of several hundred tons, by means of a plunger fitting accurately into the mold. A depth of 3 in. of powder is compressed into a tile of 1 in. in thickness. It is then removed, heated in a hot chamber, fired, and glazed if required.

The figured tiles are made in a different manner. The clay is worked in a moist state, but very stiff, first into square blocks. These are cut into square slices or slabs by passing a wire through them; upon this is put a facing of fine clay of the color of the ground of the pattern—another layer, of a different quality of clay, is sometimes added to the bottom, to prevent warping. It is then placed in a mold, with a plaster-of-Paris slab forming the top, on the under surface of which is the pattern in relief. This slab is pressed down, and thus forms a deep impression of the pattern which is to be produced in another color. The clay of the requisite color to form the pattern is now poured, in a semi-fluid state, into this depression, and allowed to flow over the whole face of the tile; then it is set aside until dry enough to have its surface scraped and smoothed on a whirling table. By this means the superfluous clay is removed, and the pattern is

brought out clear and well-defined, the two colors of clay forming one smooth flat surface. The tile is then dried and fired.

By Malkin's patent process, inlaid as well as plain tiles are now wholly made of dried slip. The pattern is produced by the use of brass plates one eighth of an inch thick, a separate one being used for each color. Thus, if it consist of an ornament in red and white on a blue ground, one plate is perforated so as to enable the red portion of the clay powder to be filled in, another is cut for the white portion, and a third for the blue ground. When all are filled up, the tile is pressed in a screw-press and fired.

Tiles of this kind were used for paving churches in England and on the continent from the 12th to the 15th c., after which they fell into disuse. The modern manufacture is therefore nothing more than a revival, with some improvements, of an ancient art.

ENCEINTE (Fr.), in fortification, denotes generally the whole area of a fortified place. Properly, however, it means a cincture or girdle, and in this sense the *enceinte* signifies the principal wall or rampart encircling the place, comprising the curtain and bastions, and having the main ditch immediately outside it.

ENCEPH'ALOCELE (derived from the Gr. *encephalon*, the brain, and *kele*, a tumor), is the term applied to a tumor projecting through the skull, in one of the parts where the bones are incomplete in infancy, and consisting of a protusion of the membranes of the brain, containing a portion of brain itself. The most common situation of such tumors is in the middle line and at the back of the head. Surgical interference is scarcely ever justifiable, and all that can usually be done is to give uniform support to the tumor, and to defend it from injury.

ENCHON'DROMA is the term employed in pathological anatomy to signify an abnormal cartilaginous growth. These growths most commonly occur in connection with the bones, and they are not unfrequent in some of the glandular structures. See TUMORS.

ENCHO'RIAL CHARACTERS. See HIEROGLYPHICS.

ENCINA, or ENZINA, JUAN DEL, 1468–1534; the father of the Spanish drama, educated at Salamanca. About the close of the century he began to exhibit dramas of his own construction, in which he sometimes played low comedy parts. Early in the 16th c. he went to Rome and joined the priesthood. He visited Jerusalem, and published an account of his journey. His dramatic works mark the transition from the purely religious to the secular stage.

ENCKÉ, JOH. FRANZ, the well-known astronomer, was b. Sept. 23, 1791, at Hamburg, where his father was a clergyman. After studying at Göttingen, he served, during the campaign of 1813–14, in the artillery of the Hanseatic legion, and in 1815, in the Prussian army, as lieut. of artillery. On the establishment of peace, he left the service, and became assistant, and afterwards principal astronomer in the observatory of Seeberg, near Gotha. In 1825, chiefly at the instigation of Bessel, he was called to Berlin as successor to Tralles, in the secretaryship of the academy of sciences, and as director of the observatory. While at Gotha, the astronomical prize offered by Cotta was awarded to E. by the judges Gauss and Olbers, for his determination of the orbit of the comet of 1680. This led him to solve another problem, which had been proposed along with the other—viz., the distance of the sun. The solution, by means of the two transits of Venus in 1761 and 1769, is published in two separate tracts (*Die Entfernung der Sonne*, Gotha, 1822–24). In 1819, he proved that the comet discovered by Pons, Nov. 26, 1818, revolved in the hitherto incredibly short period of about 1200 days, and had been already observed in 1786, 1795, and 1805. It has since gone by the name of E.'s comet, and has appeared regularly; the period of its recurrence being 3.29 years, or about $3\frac{3}{10}$ years. See COMETS. E.'s researches on this subject are contained in the *Transactions of the Berlin Academy*. In 1830, he undertook to edit the Berlin *Astronomical Almanac*, in which he published a number of astronomical treatises. Three volumes have appeared of *Astronomical Observations at the Berlin Observatory*, begun in 1855. He died 2d Sept., 1865.

ENCORE ("Again"), a French expression, generally used in England by the audience of a theater or concert-room, when requesting the repetition of the performance of a piece of music. It is not used by the French themselves, who, in similar circumstances, exclaim *bis* (twice).

EN'CRATITES, the name of early ascetics in the Christian church, who forbade marriage, the eating of the flesh of animals, and the use of wine, going so far as to substitute water for wine in the eucharist.

ENCRI'NAL or ENCRIN'ITAL **LIMESTONE**, a name given to some carboniferous limestones, from the great abundance in them of the calcareous skeletons of encrinites (q.v.), whole masses of the rock being almost entirely composed of them.

ENCRI'NAL or ENCRINITAL LIMESTONE, a limestone largely composed of the remains of crinoids. There are large beds in the Hamilton and Helderberg groups in New York state.

EN'CRINITES, a name applied generally to the fossil crinoidea, a family of echinodermata (q.v.). The popular name, *stone lilies*, is given to the numerous fossil species,

from the resemblance which many of them present when the rays are closed to the lily. Hence also the name crinoidea. Crinoids are characterized by having their bodies supported, during the whole or part of their existence, on a longer or shorter jointed calcareous stem. The stem is attached either by the expanded base, or by jointed processes, to the rocky bed of the sea, or perhaps, in some cases, to floating bodies, like barnacles. Occasionally, numerous root-like side-arms are sent out from the base of the stem to strengthen and support it; and in some species, as in the recent *pentacrinus*, the column throughout its length is furnished with axillary side-arms. The stem is round or five-sided; in one genus only is it elliptical. It is composed of a number of joints, perforated in the center, for the passage of a soft portion of the animal, and beautifully sculptured on the articulating surfaces. The body is cup-shaped, and composed of many-sided plates on the under surface, to the center of which the stalk is attached, while the upper surface is covered with a coriaceous skin, protected by many small plates. On this was situated the mouth, which was frequently proboscidiform, and near it was the anal orifice—the alimentary canal being turned upon itself, as in the bryozoa. The arms spring from the edges of the cup. They are five in number at their origin, but, with few exceptions, speedily divide and subdivide dichotomously. The arms are composed of articulated calcareous joints, similar to those of the stems. Each joint is furnished with two slender-jointed appendages or cirri, of use to the animal in capturing its prey, which consisted of mollusca and other small animals. The number of joints in some species is truly amazing. Dr. Buckland calculated that *pentacrinus briareus* consists of at least 150,000; and "as each joint," according to Carpenter, "was furnished with at least two bundles of muscular fiber—one for its extension, the other for its contraction—we have 300,000 such in the body of a single *pentacrinus*, an amount of muscular apparatus far exceeding anything that has elsewhere been observed in the animal kingdom."

E. are represented in the British seas by one species, *comatula rosacea*, which in its perfect state is free, and moves about in the same manner as other star-fishes, but is in its structure a true crinoid, and, in fact, when young, has the flexible stalk characteristic of the order. It is doubtful whether more than one species (*pentacrinus caput medusæ*) of permanently stalked E. lives in modern seas. It is a native of the West Indian seas.

The family commenced its existence with the earliest sedimentary deposits. Seventy-three genera have been described, containing upwards of 300 species, two thirds of which are found only in paleozoic rocks. The most ancient E. have nearly all round stems, the few that are five-sided having the articulated surface of the joints simply radiated, and not complexly sculptured as in pentacrinus, the type of a division of the order which appears first in the lias. The earlier seas literally swarmed with these animals. "We may judge," says Dr. Buckland, "of the degree to which the individual crinoids multiplied among the first inhabitants of the sea, from the countless myriads of their petrified remains which fill so many limestone beds of the older formations, and compose vast strata of entrochal marble, extending over large tracts of country in Northern Europe and North America. The substance of this marble is often almost entirely made up of the petrified bones of encrinites, as a corn-rick is composed of straws." See CRINOIDEÆ and PENTACRINUS.

ENCUMBERED ESTATES COURTS. See INCUMBERED ESTATES COURTS.

ENCUMBRANCE. See INCUMBRANCES, *ante*.

ENCYCLOPÆ'DIA means properly a book or work professing to give information, more or less full, on the whole circle of human knowledge. The name is compounded of two Greek words, *enkyklios*, circular or general; and *paideia*, discipline or instruction. These words were used by the Greeks and Romans to signify the circle of instruction through which every free-born youth had to pass before entering on public life. That circle embraced more particularly grammar, music, geometry, astronomy, and gymnastics, and afterwards became the "seven liberal arts" of the middle ages. The compound name E. appears to have been unknown to the Greeks, and also to the Latin writers of the classic period; and there is no evidence that either Greeks or Romans ever applied the words, single or compounded, to designate a book. The short form *Cyclopædia* has still less classical authority than encyclopædia.

Encyclopædias, in the modern sense of the word, are most commonly alphabetical; but sometimes the arrangement is "rational," i.e., according to the natural relations of the subjects. An alphabetical E. is a dictionary of universal knowledge. Besides this, its proper meaning, of a repertory of universal knowledge, the name E. is often applied —less properly perhaps—to alphabetical works whose scope is limited to a particular branch—works differing in no respect from others which are styled dictionaries, gazetteers, etc. See DICTIONARY. As all works of this kind, which now form a large and increasing section of literature in every language, have in so far a common character with encyclopædias proper, we may give some account of the whole class under the present head.

For the sake of convenience, they may be arranged in three divisions: 1. The earlier works of this kind, having, for the most part, merely an encyclopædic character, i.e., embracing a large range of subjects, without distinctly aiming at universality; 2. Ency-

clopædias proper, which treat of the whole circle of human knowledge; 3. Books professedly confined to a definite department of knowledge, whether under the name of E., dictionary, gazetteer, or other title. As books of this class profess to touch on every important point that comes within their scope, they may be considered as encyclopædic in a limited sense. In the following sketch, the distinction between the first and second of those classes, which is of a somewhat indeterminate kind, is not strictly adhered to when it would interfere with the chronological sequence.

1. The earliest work of an encyclopædic character is generally ascribed to Speusippus, a disciple of Plato. The great collections of Varro (*Rerum Humanarum et Divinarum Antiquitates* and *Disciplinarum libri* ix.), of the elder Pliny (*Historia Naturalis*), of Stobæus, of Suidas, of Isidorus (the *Origines*), and of Capella, belong to the same class, but they exhibit no plan, and are only confused accumulations of the then known arts and sciences. Vincent of Beauvais (1264) surpassed them all. He gathered together with wonderful diligence the entire knowledge of the middle ages in three comprehensive works, *Speculum Historiale, Speculum Naturale*, and *Speculum Doctrinale*, to which soon after an unknown hand added a *Speculum Morale*. But these, as well as the other similar compilations which appeared in the later mediæval period under the title of *Summa*, or *Speculum* (mirror), are marked throughout by a lack of philosophic spirit. Perhaps the nearest approach to the modern E. by an ancient writer, dates two centuries earlier than the time of Beauvais. In the 10th c., flourished Alfarabius, the ornament of the school of Bagdad, who wrote an encyclopædic collection of knowledge, remarkable for its grasp and completeness, and which still lies in MS. in the Escorial of Spain. Among the earliest and most noted of the modern encyclopædias was that of Johann Heinrich Alsted, or Alstedius, which appeared in Germany in two volumes in 1630. It consisted of 35 books in all, of which the first four contained an explanation of the nature of the rest. Then followed six on philology, ten on speculative and four on practical philosophy; three on theology, jurisprudence, and medicine; three on the mechanical arts; and five on history, chronology, and miscellaneous topics. Two important French works belong to this century—the one is Louis Moreri's *Grand Dictionnaire Historique et Critique*, of which the first edition appeared at Paris in 1673, and the last in 1759; the other, Peter Bayle's famous *Dictionnaire Historique et Critique*, published at Rotterdam, in 4 vols., 1697. The first encyclopædic *dictionary*, so far as known, appeared in Germany as the *Lexicon Universale* of Hoffmann (2 vols., Basel) in 1677. Some time after there appeared in France, Thomas Corneille's *Dictionnaire des Arts et des Sciences*, 2 vols. (Paris, 1694). Dictionaries limited to the explanation of technical terms had long been common throughout Europe; but previous to Hoffmann's work, no attempt had been made to bring the whole body of science and art under the lexicographic form. A highly successful attempt identical in kind, and attributable in idea, it may be, to the German work just alluded to, was the *Lexicon Technicum* of Dr. Harris, 2 vols. folio (London, 1710), which may fairly be regarded as the parent of all the dictionaries of arts and sciences that have since appeared in England. The *Cyclopædia* of Ephraim Chambers, published in 1728, in two very large folio volumes, presents the next marked advance in the construction of encyclopædical dictionaries. This one was brought out with considerable claims to originality of arrangement. The author endeavored to communicate to his alphabetical materials something of the interest of a "continuous discourse," by an elaborate system of cross references. Another peculiarity of this cyclopædia was that its author, in the details of mathematical and physical science, gave only conclusions and not processes of demonstration. It was long a very popular work. The largest and most comprehensive of the successors to Hoffmann's book in Germany, was Zedler's *Universal Lexicon*, 64 vols. (Leip. 1732–50). In point of comprehensiveness, this work should be classed with the encyclopædias proper, there being almost nothing then known that may not be found in it. Perhaps the strongest impulse, if not in all respects the best, communicated by this successful attempt of Ephraim Chambers, was given to the French mind through D'Alembert and Diderot. Their *Encyclopédie* was really, though not professedly, founded upon E. Chambers's book, which an Englishman named Mills had translated between 1743 and 1745, though the French version of it never was published. The great French *Encyclopédie* was written by various authors of high literary and philosophical attainments, but of whom nearly all were tainted too much with the most impracticable revolutionary ideas, besides holding for the most part extremely skeptical opinions. The *Encyclopédists* excluded both biography and history from its scope, yet infused into it more originality, depth, and ability, than ever had appeared before within the boards of an encyclopædical dictionary. It appeared at Paris in 28 vols. between the years 1751–72, and was followed by a supplement in 5 vols. (Amst. 1776–77), and an analytical index in 2 vols. (Paris, 1780). The work was everywhere received with the greatest enthusiasm, and it secured a place in the literary history of the nation for the editors and principal writers, who are ordinarily known as the *Encyclopédists* of France. They were D'Alembert and Diderot the editors, Rousseau, Grimm, Dumarsais, Voltaire, baron d'Holbach, and Jancourt. [See La Porte's *Esprit de l'Encyclopédie* (Paris, 1768); and Voltaire's *Questions sur l'Encyclopédie* (Paris, 1770).] D'Alembert's celebrated preliminary discourse was garbled in various pretentious works of this class published for the most part in England; such were Barrow's *New and Universal Dictionary of Arts and Sciences*, 1 vol. folio, 1751; and the *Complete Dictionary of Arts*

and Sciences, by Croker, Williams, and Clerk, 3 vols. folio, 1766. A somewhat better, though rather illogical performance was published by a "Society of Gentlemen" in 1754 in four 8vo vols., generally known as *Owen's Dictionary*, from the name of the publisher of it. The first rude outline of the ponderous and solid *Encyclopædia Britannica* was laid down in the year 1771, in three volumes, but it was nothing more than a dictionary of arts and sciences; it had not yet attained to its subsequent universality. Such is a brief outline of the earlier kind of encyclopædias.

2. The first E. proper that demands our attention is the *Encyclopædia Britannica*, of which the 2d comparatively complete edition, containing biographical and historical articles, appeared in 10 vols., between 1776 and 1783; the 3d edition was completed in 18 vols. in 1797; the 4th edition, in 20 vols., in 1810; the 5th and 6th editions, and supplements, in 6 vols., appeared between 1815–24; the 7th edition in 21 vols., in 1830–42; the 8th edition, in 21 vols., 1852–60; and a 9th edition is now in progress. The method pursued by this work, while thoroughly alphabetical, consists in a combination of the systematic and the particular. In few instances is any science broken up into fractional parts; nearly all the sciences are given in treatises as they severally occur in the order of the alphabet. In some cases, however, where obscurity might result from such a plan, the other method is adopted. A marked feature of this work, is the number of complete treatises and dissertations which it contains by men of European name. From first to last, this E. has been executed and published in Edinburgh, the literary reputation of which it has helped in no small degree to increase. The next E. that we must notice is the *Encyclopédie Méthodique par Ordre des Matières*, which was begun in 1782, and was not finished till 1832. It extends to 166½ vols. of text, with 51 "parties," containing 6,439 plates. Each subject is treated in a separate volume or series of volumes, so that the work is a collection of separate dictionaries, more extensive than any encyclopædic work that has yet appeared. A work of higher scientific value, however, and even of a more varied nature, has been in progress for nearly half a century in Germany, undertaken originally by professors Ersch and Gruber in 1818, and which has since continued to appear, in three several sections of the alphabet, up to the present time. There have already appeared of this great *Allgemeine Encyclopädie der Wissenschaften und Künste* some 150 volumes. In 1802, Dr. Abraham Rees projected an extended and improved edition of Ephraim Chambers's *Cyclopædia*, which was completed in 45 volumes in 1819. The system of cross-references peculiar to E. Chambers is very effectually carried out in this book; but besides including a great accession of historical and biographical detail, it contained a large number of papers, prepared by competent writers, on subjects with which their life had rendered them familiar. Another work of considerable merit, which began to appear in 1810, was Brewster's *Edinburgh Encyclopædia*, edited by the late sir David Brewster, and completed in 18 vols., in 1830. In 1812, a great impetus was given to encyclopædic publications, by the appearance of the *Conversations-Lexicon* of F. A. Brockhaus of Leipsic. It has since gone through twelve editions. The eleventh issue, in 15 vols., appeared between 1864 and 1868 (supplement, 1872–73). The twelfth edition began to appear in 1875. It has been translated into nearly all the civilized languages of Europe, no fewer than *four* English works of the kind being professedly founded on it: these are the *Encyclopædia Americana*, in 14 vols. (Philadelphia, 1829–46); the *New American Encyclopædia*, 16 vols. (New York, 1858–63), of which a new ed. under the title *American Cyclopædia* appeared between 1873 and 1876; the *Popular Encyclopædia*, 7 vols. (Glas., new ed. 1874); and Chambers's *Encyclopædia*, 10 vols. (Edin. 1860-68; revised ed., 1874–79). Of these, the last-mentioned is a substantially new work, following in its construction the admirable plan of the *Conversations-Lexicon*, but making use of its valuable matter only so far as it is found suitable.

The next encyclopædic work which appeared after the *Conversations-Lexicon*, was one projected according to an original philosophic plan by Samuel Taylor Coleridge, in 1818, and finished in 1845, in 30 volumes. This *Encyclopædia Metropolitana* was arranged in four divisions: 1st, the pure sciences; 2d, the mixed and applied sciences; 3d, biography and history; and 4th, miscellaneous and lexicographic articles. The contributions to the first two divisions were written by persons of recognized ability, and they have nearly all been published separately in 8vo volumes since the *Metropolitana* appeared. If the book had any fault, it was that the plan of it was too rigidly philosophical, and therefore not adapted to be consulted dictionary fashion; for although in one sense the alphabetic arrangement, by its jumble of subjects, is most heterogeneous and irrational, it recommends itself to popular acceptance by its extreme simplicity; and in point of fact, no E. has ever been thoroughly popular that has not been executed on the plan of a single alphabet, in which all subjects, however various, are included. Next appeared the *Penny Cyclopædia* of the society for the diffusion of useful knowledge, which was begun in 1833, and completed in 1843, in 28 volumes. This work was perhaps, at the time it appeared, the most useful and convenient, for the purposes of general consultation, of any encyclopædical treatise that had ever been issued. The *English Cyclopædia* is founded on the copyright of the *Penny Cyclopædia*, but is rearranged into four great divisions, which are each given in the order of the alphabet, viz., geography, natural history, biography, and arts and sciences. This publication was begun in 1853, and was completed in 1861, in 22 vols.; a synoptical index appeared in 1862, and a supplementary volume for each division has since (1869–73) been issued.

Among other publications of this character which have appeared in the course of the present century, may be mentioned Wilkes *Encyclopædia Londonensis*, in 24 vols. 4to (Lond. 1810–29); the *Encyclopædia Perthensis*, in 23 vols. (Edinburgh, 1816); and the *London Encyclopædia*, 22 vols. (Lond. 1829). The French have likewise published an *Encyclopédie des Gens du Monde*, in 22 vols. 8vo (Par. 1833–44); and *Encyclopédie Moderne*, which, with its supplement, occupies 42 vols. 8vo (Par. 1846–62); and a *Dictionnaire de la Conversation et de la Lecture*, 2d ed. in 16 vols. (Par. 1854–57), to which a supplement was afterwards added. The last of these is to a large extent based on the *Conversations-Lexicon* of Brockhaus. The most notable of the other German encyclopædies are Meyer's *Neues Conversations-Lexicon*, in 15 vols. (1857; 3d ed. 1874); and Pierer's *Universal Lexicon*, in 34 vols. (Altenburg, 1840–46), a sixth edition of which began to appear in 1875. In addition to these, there are several other continental encyclopædies, which are based upon the *Conversations-Lexicon*—such as the *Enciclopedia Española* (Madrid); the *Nuova Enciclopedia Popolare Italiana* (Turin); the *Nordisk Conversations-Lexicon*, 5 vols. (Copenhagen, 1858–63); and the *Svenskt Konversations-Lexikon*, 4 vols. (Stockholm, 1845–51); besides others in Russia, Hungary, the Netherlands, etc.

3. We have now to direct attention briefly to those books that are *dictionaries* or encyclopædias for one branch of knowledge. These works have been always very numerous, both in this country and on the continent. Such are the *Biographie Universelle* (commenced in 1811; new edition, 1842–65); Chalmers' *Biographical Dictionary*, in 32 vols. (1812–17); the *Dictionnaire des Sciences Médicales*, 60 vols. (Par. 1812–22); *Nouveau Dictionnaire d'Histoire Naturelle*, 36 vols. (Par. 1816–19); F. Cuvier's *Dictionnaire des Sciences Naturelles*, 60 vols. text, 10 vols. plates (1816–45); *Dictionnaire de l'Industrie*, etc., 10 vols. (Par. 1834–41); M'Culloch's *Commercial Dictionary* (1832; last edition, 1869); M'Culloch's *Geographical Dictionary* (1st edition, 1841; new edition, 1866); the *Dictionary of Practical Medicine* (Lond. 1866); Chambers' *Cyclopædia of English Literature* (1843; third edition, 1876); Spon's *Dictionary of Engineering* (1869–74); Johnston's *Gazetteer* (1850; new edition, 1877); Morton's *Cyclopædia of Agriculture*, 2 vols. (1855); the *Nouvelle Biographie Générale* (1855–66); Lippincott's *Gazetteer of the World* (Philadelphia, last ed. 1873); Allibone's *Dictionary of British and American Authors* (Philadelphia, 1859–71); Ure's *Dictionary of Arts, Manufactures, and Mines* (1839; 7th ed., supp. vol. 1877); Schmid's *Encyclopædia des Erziehungs und Unterrichtswesen* (1859–75). Nor must we overlook the dictionaries of Dr. William Smith, viz., the *Dictionary of Greek and Roman Biography and Mythology*, 3 vols. (1843–48; new ed. 1849–51); the *Dictionary of Greek and Roman Antiquities*, 2d ed. (1849); the *Dictionary of Greek and Roman Geography*, 2 vols. (1854–57); the *Dictionary of the Bible*, 3 vols. (1860–63); and the *Dictionary of Christian Antiquities* (vol. i. 1875). These dictionaries are the product of the ripest scholarship in Britain, and are perhaps the most splendid specimens in existence of encyclopædias devoted to special branches of knowledge. See DICTIONARY.

ENCYCLOPÉDISTS. See ENCYCLOPÆDIA.

END. This familiar word is concerned in some important discussions, and especially in ethics. It is in the sense of "the thing aimed at," the object, purpose, or goal of human action, that we have here to consider it. There is a fundamental contrast between science and art, knowledge and practice. Science, or knowledge, embraces the general order of the universe, and states that order in the form by which we can take in as much as possible in one view; it is the fullest intellectual comprehension of the phenomena of nature that the mind can attain to. Art, or practice, on the other hand, selects and appropriates certain items of knowledge, so as to subserve some useful purpose, some exigency of human life. Thus, agriculture, navigation, law, politics, education are all branches of practice; they involve knowledge, but in strict subordination to their several purposes. The navigator studies astronomy, not with a view to enlighten his understanding as to the mysteries of the solar system and the starry sphere, but with a view to the guidance of his course in the sea. In short, to an art (the word is not here used in the narrow sense of a fine art), or a department of practice, belongs in the first place the consideration of the *end*. Every art has its E., which is its distinction from every other. In most of the arts, the E. is clear and unmistakable; we all know what is expected of a builder, a soldier, or a judge; the only question is how to obtain the knowledge requisite for adequately performing each separate function. But there are some departments where the E. itself is not agreed upon, which casts a peculiar difficulty on the practice. Thus, it was remarked under CIVILIZATION, that the E. of the whole mechanism of human society, including politics, etc., is differently viewed by different minds. But it is in the one special department of morality that the consideration of the E. is of most vital consequence. This feature of the ethical problem has been very little adverted to in modern discussions, while the ancient philosophers kept it more prominently before them. Aristotle begins his *Ethics* by remarking that every art aims at some good; most arts, as medicine, ship-building, generalship, having limited or partial ends; while some comprehend much wider ends than others. The largest E. of all is the good of mankind collectively. Hence he goes on to inquire what is the highest good of man, and finds that happiness is neither pleasure, nor honor, nor virtue (by itself), nor wealth, but that it

is "an energy of the soul according to virtue;" activity, in opposition to oriental notions of luxurious repose, being an essential in his eyes. He has next, therefore, to inquire what "virtue" is, according to which a man must employ his activity—a question of no easy solution. Still, the discussion brings out the one fact, that morality is a branch of practice, but unlike most arts in this, that the E. is peculiarly difficult to determine precisely. Accordingly, it is necessary to have in connection with it a set of discussions, called by Mr. J. S. Mill (*Logic*, concluding chapter) teleology, or the doctrine of ends, corresponding to what the German metaphysicians have termed the principles of practical reason. The various theories of moral obligation differ in their statement of the E. of morality; according to one, it is the self-interest of the individual; according to another, the interest of mankind on the whole. The most prevalent theory is the harmonizing with a certain inward sentiment called the moral sense. See ETHICS.

ENDEM'IC (from *en*, among, and *dēmos*, the people), a term applied to diseases which affect numbers of persons simultaneously, but so as to show a connection with localities as well as with their inhabitants. Endemic diseases are usually spoken of as contrasted with epidemic (q.v.) and sporadic (q.v.); the first term indicating that a disease infests habitually the population within certain geographical limits, and also that it is incapable of being transferred or communicated beyond those limits; while, on the other hand, a disease is termed epidemic if it is transmitted without reference to locality; and sporadic if it occurs in isolated instances only. The theory, accordingly, of E. diseases it, that they are in some way or other connected with the soil—the result of terrestrial influences, or *miasms*—of poisons generated within the earth, or near its surface, and diffused through the air, so as to be weakened in proportion to the distance from the source of the poison. Such poisons are always observed to be more virulent in summer than in winter—more dangerous at night, when the vapors are concentrated on the surface of the soil, than in the day time—more abundant in the plains, and in close confined places, than at a certain degree of elevation—more easily carried in the direction of the wind than in the opposite—and very often arrested altogether by water, or by a belt of forest or other luxuriant vegetation. In all these particulars, *endemic* are different from *epidemic* diseases, which bear no very obvious relation to the soil, and are not observed to be considerably modified either by the prevailing winds or the period of the day or night at which exposure to their influence takes place. The most marked type of an endemic disease is ague (q.v.) or intermittent fever, which has all the habits mentioned above, and is to so marked a degree a denizen of particular tracts of country as to lead to their being in some instances almost depopulated. Many places in Italy are a prey to the *aria cattiva* or *malaria*, as it is popularly called; and hence, no doubt, even more than for protection from human foes, the custom so prevalent in that country of building the villages on the tops of hills, so as to secure immunity from the poisonous vapors raised by the solar heat from the plains lying on either side at the base of the Apennines. Terrestrial *miasms*, or such poisons as generate E. diseases, are usually found in the neighborhood of marshy flats, or of uncultivated tracts of land at the confluence of rivers, or where a *delta*, or a wide channel subject to overflow, is formed at the upper end of a lake. In proportion, too, as the heat of the sun is greater, the tendency to malarious emanations is increased; and in the tropics, accordingly, large tracts of jungle and forest are often rendered absolutely uninhabitable and almost impassable at certain seasons, by the invisible and odorless germs of intermittent, remittent, and even continued fevers (q.v.), which are more fatal and unmanageable than the most terrible epidemic pestilence to those who are exposed to them. Such diseases are almost always sudden in their mode of attack, and they indicate the range of their influence by the number of persons attacked; but they are wholly free in most cases from the suspicion of communication by contagion (q.v.), which is so frequent in the case of epidemic diseases. The precise nature of the malarious poison has never yet been discovered with any approach to exactness. It is known, however, to be almost invariably checked by drainage and cultivation of the soil; and hence many places in Europe, formerly very productive of E. diseases, have now ceased to be so, as in the case of the Tuscan Maremma, and some parts of Kent and Essex, and of the Lothians in Scotland.

EN DERBY LAND, discovered by Biscoe in 1831, lies in lat. 67° 30′ s., long. 50° east. It appeared to the discoverer to be of considerable extent, and was closely bound by field ice, but owing to stress of weather and the extreme cold, it could not be approached within 20 or 30 m., and Biscoe was thus unable to say whether the land he discovered was an island or a strip of continental coast.

ENDER'MIC AND HYPODER'MIC METHODS OF TREATMENT. These terms are, as the names imply, used to designate certain methods of making the skin an agent for the reception of medicines. The endermic method consists in raising a blister by the ordinary process, opening it by a small puncture, which must not be at the lowest part of the bladder, gently pressing out the fluid contents, and then injecting a medicinal solution, by means of a small syringe, through the puncture into the emptied sac; or, if the medicine is in the form of powder, it may be scattered over the raw surface. The endermic method is now almost entirely superseded by the hypodermic method, in

which medicines are introduced into the subcutaneous cellular tissue by means of a very finely pointed syringe. For the invention of this process, the science of medicine is indebted to Dr. Alexander Wood of Edinburgh. It is chiefly, but not solely, to anodynes that these methods are especially applicable. It has been found that morphia given by Dr. Wood's method acts more speedily and more powerfully than when given by the mouth: moreover, the medicine given in this way does not disturb the functions of the stomach, and may be administered in those cases of irritation of that organ in which medicines introduced into it would be rejected by vomiting. A solution of acetate of morphia, carefully freed from any excess of the acid, and of such strength that three minims shall contain one third of a grain, is commonly employed, the dose varying from one to three minims, or from one ninth to one third of a grain of the salt. If the general effects of the morphia (as relief of pain and sleep) are required, any convenient part of the body, as, for instance, the fore-arm, may be selected: the skin, pinched up between the fore-finger and thumb of the left hand, is penetrated by the point of the syringe, and the solution injected. When a local action is required, as in the case of various forms of neuralgia, the solution should be injected as near as possible to the seat of pain. As some patients are remarkably susceptible to the action of morphia administered in this method, it is advisable to begin with the smallest of the above-named doses.

A scientific committee appointed by the royal medical and chirurgical society of London to investigate the physiological and therapeutical effects of the hypodermic method of injection, have sent in an elaborate report, which was read in June, 1867. Amongst the most important *physiological* facts which were observed, the following may be especially mentioned. Watery solutions of drugs subcutaneously injected were far less rapid in their action than when they were introduced into a vein. On comparing the effects of medicines subcutaneously injected with those produced when they were administered by the mouth, or by injection into the lower bowel, it was found that, in the case of some drugs, the local action was different according to the mode of administration, although the general effects produced were of the same kind. Thus, aconitine given by the mouth affected the salivary glands; when given by the rectum, it caused irritation of the gut; and when given by the skin, it occasioned local pain. The smallest dose fatal to rabbits was, by the mouth, $\frac{1}{60}$th, by the rectum, $\frac{1}{30}$th, and by the skin, $\frac{1}{100}$th of a grain: it was thus five times as energetic when given subcutaneously as when given in the most usual way. The effects of morphia when injected under the skin were also more rapidly manifested and more intense than when given by the mouth or rectum. A solution of podophyllin, which, when administered by the mouth, acts as a powerful cholagogue (bile-provoking) aperient, when injected into the skin, gives rise to free action of the kidneys. The investigations of the *therapeutic* valve of this mode of administering drugs were limited by the fact, that many substances (aconitine, for example) give rise to great local irritation when used subcutaneously. In cases of simple neuralgia, atropine was found to have a very beneficial effect when thus given, and in some cases more permanent relief followed its injection than that of morphia. The value of the latter drug was found to be much increased by this method, the required action being of longer duration, and being produced with greater rapidity and intensity. The same advantages followed this mode of giving quinine in intermittent fevers, but some caution is requisite in giving large doses, as irritation may arise from its presence under the skin. Amongst the conclusions at which the committee arrives are the following: (1) That, as a general rule, only clear neutral solutions of drugs should be employed, decidedly acid or alkaline solutions being apt to cause irritation, and even local ulcers, at the point of application; (2) that, as in the case of podophyllin, symptoms are observed to follow the administration of some drugs by the skin, which are wanting when the same drugs are otherwise administered; and (3) that the advantages to be derived from this method of introducing drugs are (*a*) rapidity of action, (*b*) intensity of effect, (*c*) economy of material, (*d*) certainty of action, (*e*) facility of introduction in certain cases, and (*f*) in some drugs, the avoidance of unpleasant symptoms.

ENDICOTT, JOHN, 1589–1665; b. England. He was sent out by the Massachusetts company in 1628, to oversee the plantation at Salem. He was deputy-governor of Massachusetts for five years, and governor in 1644–49, 1651–54, and 1655–65. He was a rigid puritan, zealous and intolerant in administration after the fashion of those times. While he was governor, four Quakers were executed for defying the law which banished them from the colony on penalty of death if they should return.

ENDIVE, *Cichorium endivia*, an annual or biennial plant, of the same genus with chicory (q.v.), said to be a native of China and Japan, but which is naturalized in the Levant, and has long been in cultivation as a garden vegetable; its blanched root-leaves being much used as a salad, and also sometimes for stewing and in soups. The root-leaves are numerous, smooth, wavy at the margin. The varieties with much curled leaves are preferred. Some of the varieties *boll* of themselves, and are thus blanched; others require to be tied up. In Britain, the seed is usually sown from the middle of May to the end of June, and by a little care and protection, plants may be kept fit for use throughout most of the winter.

ENDLESS SCREW, a screw combined with a cog-wheel, or one acting on the threads of a "female" screw sunk in the edge of a wheel. When the axis of the screw is at right angles to the plane of the wheel—that is, when the screw acts on a spur wheel—it is known as the American form.

ENDLICHER, STEPHEN LADISLAS, a distinguished botanist, was b. at Pressburg in Hungary, June 24, 1804. He was educated in his native town, Pesth, and Vienna, and then entered the church which he, however, abandoned in a few years. In 1827, he commenced his botanical and linguistic studies, and in the following year he was placed at the head of the imperial library at Vienna. In 1836, he was appointed keeper of the museum of natural history at Vienna, and in 1840, he became professor of botany in the university, and director of the botanic gardens. E. was much disturbed by the turn political events had taken in 1848, fell into a state of gloom, and in Mar., 1849, put an end to his own life. A few of his works are upon ecclesiastical subjects, but the great bulk of his writings are botanical, the most important being connected with the systematic arrangement of plants. One of his earliest works was *Flora Posoniensis* (1830); in which he describes the plants growing in the neighborhood of Posen arranged according to the natural system. His most important work *Genera Plantarum secundum ordines naturales deposita*, appeared from 1836 to 1840. In it he follows out with great elaboration the system of natural arrangement. It has had great influence on succeeding botanists, and is still one of the most complete works upon systematic botany. Among his other works are: *Prodromus Floræ Norfolkicæ* (1833); *Iconographia Generum Plantarum* (1838); *Mantissa Botanica* (1843); *Mantissa Botanica Altera* (1843); *Grundzüge der Botanik*, written along with Franz Unger (1843); etc.

ENDOCARDI'TIS, disease of the internal surface of the heart, resulting in the deposit of fibrin upon the valves. See HEART, DISEASES OF.

EN'DOCHROME (Gr. *endon*, and *chroma*, interior color), the coloring matter contained in the tissues of the lower classes of plants. It is a modification of chlorophyll, which gives the green color to the leaves of the higher classes of plants; when the chlorophyll changes its color in the autumn, in consequence, probably, of the retention of the oxygen element of carbonic acid, it is then not strictly chlorophyll, and may be called endochrome. Some chemists say that endochrome and chlorophyll have the same constitution, but it must be remembered that chlorophyll changes in accordance with the action of light.

ENDOG'ENOUS PLANTS, or ENDOGENS (Gr. *endon*, within, and *genos*, birth or origin), one of the great classes into which the vegetable kingdom is divided, the others receiving the corresponding designations of *exogenous plants* and *acrogenous plants*. The character from which this designation is derived is found in the structure of the stem, which does not increase in thickness by additional layers on the outside like the *exogenous* stem, familiarly illustrated in all the trees of the colder parts of the world, but receives its additions of woody matter in the interior; and in general does not continue to increase indefinitely in thickness like the exogenous stem, but is arrested when a certain thickness has been attained, different in different species, and afterwards increases only in length. When a transverse section is made of an endogenous stem, numerous bundles of vessels are seen dispersed irregularly in cellular tissues, the younger and softer parts of the stem exhibiting the cellular tissue in greatest proportion, the older and lower parts chiefly abounding in vascular bundles, which are, however, somewhat scattered in the central part of the stem, and are densely aggregated towards the circumference, there, in the palms generally, forming very hard wood, in some of them wood so hard that it cannot be cut with a hatchet. The stems of E. P. in the far greater number of cases produce terminal buds only, and not lateral buds, and are therefore unbranched. From the bases of the leaves, definite bundles of vascular tissue converge towards the center; but these extending downwards extend also outwards, and thus an interlacing of fibers takes place, which contributes not a little to the strength and compactness of the wood in the lower part of the stem. As the fibers extend downwards, they also become attenuated, spiral and porous vessels disappearing, and nothing but the most ligneous substance remaining. It is the hardening of the outer part of the stem which arrests its increase in thickness. Endogenous stems have not a distinct *pith* nor any *medullary rays*. When the central part is soft and pith-like, yet it is not distinctly separated from the surrounding wood, and has no *medullary sheath*. In many E. P., as in the greater number of grasses, the center of the stem is hollow. This is not the case at first, when the stem begins to grow; and when any cause makes the growth of the stem unusually slow, so that it is much stunted, it remains solid; the fistular character of the stem is the result of its rapid growth, rupturing the cells of the central portion, which finally disappear. Endogenous stems have no *cambium* and no proper *bark*. There is, indeed, a cellular *epidermis;* and there is also within it, and exterior to the hardest woody part of the stem, a comparatively soft layer of a corky substance, which is sometimes called bark, sometimes *false bark*, which does not separate from the wood below it without leaving myriads of little broken threads, the ends of the fibers which have extended into it from the hardest part of the stem. In those exogenous plants which produce lateral buds and branches, the fibers of the branches on descending to the stem extend on the outside of the proper stem, between its hardest portion

and the false bark; and in this way a great thickness is sometimes attained, as in the dragon-tree. In the grasses, a *plexus* of fibers takes place at the nodes, the fibers crossing from one side to the other. No British tree—and it may almost be said, no tree of temperate or colder climates—is endogenous. Almost all the endogenous trees are palms, although a few, as the dragon-tree, belong to other orders. E. P., however, are numerous in all parts of the world. Among E. P. are many of the plants most useful to mankind, particularly palms and grasses, all the true corn-plants being included among the latter. Nutritious substances are very extensively produced both in the fruit or seed, and in other parts; poisonous products are comparatively rare, although found in the *araceæ*, *liliaceæ*, *melanthaceæ*, and other orders. Aromatic secretions are characteristic chiefly of one order, *scitamineæ*. Besides palms and grasses, many of the E. P. are of great beauty, and many produce most beautiful flowers. Lilies and orchids may be mentioned as instances.

E. P. are *monocotyledonous;* and the terms *endogenous* and *monocotyledonous* are therefore often employed indiscriminately to designate the class. But Lindley distinguishes a class of *dictyogens* (q.v.), which, although monocotyledonous, have stems approaching to the exogenous character. The leaves of E. P. generally exhibit parallel venation, which is indeed strictly confined to them, although a venation resembling it, or rather simulating it, may be seen in some exogenous plants. The seed also germinates in a peculiar manner, different from that of exogenous plants, and to which the name *endorhizal* has been given, the radicle being protruded from within the substance of the embryo, and surrounded by a cellular sheath formed from the integument which it breaks in its egress.

ENDORSE. See BILL.

ENDORSE, in heraldry, an ordinary containing the fourth part of a pale. *Endorsed,* again, or *indorsed,* signifies that objects are placed on the shield back to back.

EN'DOSMOSE AND **EX'OSMOSE** (Gr. inward motion and outward motion), terms applied by Dutrochet, the first investigator, to the transfusion that takes place when two liquids or two gases of different densities are separated by an animal or a vegetable membrane. As the transmission has no necessary relation to outwards or inwards, the term *osmose,* or *osmotic action,* is now preferred. See DIFFUSION.

This action performs a very important part in living organisms, and explains many phenomena of the circulation of sap and the processes of nutrition, which were previously referred only to the wonderful action of vital energy. Thus, the blood continually streaming through the capillary vessels gives forth a portion to the surrounding cells, and so supplies them with the necessary chyle. This may, however, by the expansion of the capillary vessels (see INFLAMMATION), lead to immoderate exudation. On the other hand, the blood, in passing by, takes up a number of worn-out constituents of the juices of these cells, and in this way serves, by the exchange which it effects, to restore the body, and to disburden it of products which have become useless.—In plants also, osmose performs an important part in the process of nutrition and the motion of the sap. The substances in the cells of plants are usually denser than the fluids without, and thus a process of endosmose takes place, by which the plant is supplied in the first instance from the soil, being incapable, however, of appropriating any nourishment which is not presented in a liquid state to the fibrils of its roots; whilst that which the roots give off by exosmose, is supposed gradually to unfit the soil for the growth of the same kind of plant. The bursting of the capsules of some kinds of plants is owing to a process of endosmose going on in the cells, as in the fruit of the elaterium or squirting cucumber. Some of the *entozoa,* as tape-worms, seem to live entirely by *endosmose.* See OSMOSE.

ENDOWED SCHOOLS ACTS. The restrictions placed upon the endowed schools of England, both those of royal and private foundation, in regard to terms of admission, course of study, etc., were found inconvenient and injurious to the schools, and the power of parliament was invoked to make certain needful changes; and during the present reign several statutes have been enacted for this purpose. The act 3 and 4 Vict. c. 77 empowered courts of equity to make decrees or orders extending the systems of instructions and the right of admission to any school, and to establish schemes for the application of its resources, having due regard to the intentions of the founder. The act 23 Vict. c. 11 required the trustees and governors of endowed schools to make such order as, without interfering with the religious teaching of the other scholars or authorizing any new religious teaching, should admit children of other denominations than that to which the foundation belongs, except where the foundation expressly requires the children to be instructed according to the formularies of such denomination. The most important public schools—Eton, Harrow, Westminster, etc.—were exempted from the operations of these acts. Another act annexed certain conditions to the appointment of officers in endowed schools. The act of 1869 is most important of all. It authorizes the appointment of commissioners, "with power in such manner as may render any educational endowment (with certain specified exceptions) most conducive to the education of boys and girls, and either of them, to alter and add to any existing, and to make new trusts, directions, and provisions which affect such endowment and the education promoted thereby." A subsequent act continues and amends the act of 1869,

and one still later transfers the power of the endowed schools commissioners to the charity commissioners.

EN'DRÖD, a large village of Hungary, in the county of Bekes-Csanad, on the Körös, 90 m. e.s.e. from Pesth. Pop. 8,700. The surrounding district produces much corn, wine, flax, honey, and cattle.

ENDY'MION, in Greek mythology, was a son either of Zeus or of Aëthlios, and followed, according to some accounts, the occupation of a herdsman or hunter, but according to others, was king of Elis. On account of his uprightness, he is said to have received, at his own request, from Zeus, the gift of immortality, unfading youth, and everlasting sleep; but another version is, that Zeus having taken him up to Olympus, E. fell in love with Here (Juno), and was condemned by her enraged husband to eternal sleep on mount Latmos. Others, again, prettily fable that Selene (the moon), charmed by the beauty of the youth, conveyed him to Caria, and sent him to sleep on mount Latmos, that she might nightly kiss him unobserved. The Eleans, on the contrary, declared that he died among them, and in proof of it were wont to show his monument. The myth of E. has been happily interpreted by Max Müller in his article on comparative mythology, in the *Oxford Essays* (1856). E., according to him, is one of the many names of the sun, but with special reference to the setting or dying sun, being formed from *enduo*, probably a dialectic variety of *duo*, the technical verb in Greek to express sunset. E. sleeps in the cave of Latmos, i.e., of night (from the same root as leto or latona, the night). So far the myth poetically describes certain phenomena of nature, the sinking of the sun in the west, and the rising of the moon, that seems to follow his departing beams. But the original signification of the metaphors becoming lost, as might naturally happen when the words expressing them had only a local usage, it was, we may say, inevitable that people should transfer the metaphors to persons, and invent a history to supply the place of the vanished poetry. And this invention, or more properly, explanation (for it was doubtless made in all good faith), is what properly constitutes the myth of Endymion. The story has been made the subject of a poem by Keats.

ENE'MA (Gr. *en*, in, and *iēmi*, I enter), a medicine or fluid substance conveyed into the body by injection, usually through the rectum or lower bowel. See CLYSTER.

ENEMIES, ADHERING TO THE QUEEN'S. By 25 Edw. III. st. 5, c. 2, it is declared that if a man "be adherent to the king's enemies in his realm, giving them aid and comfort, in the realm or elsewhere," he is to be held guilty of treason. Under this statute, the subjects of states at war with us are held to be enemies, though war has not been solemnly proclaimed. Every species of assistance, whether by joining in acts of hostility, or sending supplies or intelligence to the enemy, is deemed an act of adherence. To incite to hostilities the subjects of a state at amity with us, is not held to fall under this provision. But if the subjects of a friendly state make a hostile invasion, any British subject rendering assistance will be deemed guilty of treason under this clause. See TREASON.

ENEMY. An E., according to the civil law, is one who has publicly declared war against us, or we against him; all others are thieves or robbers. *Hostes hi sunt qui nobis, aut quibus nos, publice bellum decrevimus; cæteri latrones aut prædones sunt.—Digest*, i. 16, 118. Thus, in order to constitute an E., there must be a public declaration of war. This declaration must also be made by a duly organized state or kingdom, for a declaration of war by any turbulent body of men is not sufficient; and a hostile act committed by private citizens will not justify a war, unless that act be sanctioned by the government. The purpose for which this public declaration is required, is stated by Grotius to be that it may be clearly known that the war is undertaken not as a venture, but by the will of the two people. Hostilities having been formally declared, every subject of the hostile nations becomes an E. of the opposing state, as do likewise those independent nations which attach themselves to the interests of either party. According to ancient usage, the utmost violence and cruelty was lawful towards those who were enemies of the state; but by the humane principles which prevail in modern times, warfare is to be carried on subject to certain general rules, which are intended as much as may be to abridge the calamities of war, and to protect the rights of individuals. Thus, an army invading an enemy s country is bound to suffer, as far as possible, the peaceable inhabitants to remain unmolested. Unnecessary devastation of the country and the seizure of property are also contrary to the laws of civilized war; and Grotius lays it down that the use of poisoned weapons, and of assassination, and violence to women, are to be reprobated. On the other hand, individuals taking up arms, without the sanction of the state, in order to annoy an invading E., are regarded as lawless marauders. The result of this distinction is, that such persons are not treated as prisoners of war, but are subject to be summarily dealt with by the commander of the invading army. As to the right of individuals to fit out vessels for the annoyance of the E., see PRIVATEER and PIRACY. It appears to be a recognized principle of international law, that the property of an alien enemy residing in either of the hostile states may be confiscated. The Americans, during the war with England, asserted this right in regard to British property found in their territory. But the usage of civilized nations for a long period has much modified the stern rule of law. It is provided by Magna

Charta, cap. 30, that if merchants "be of a land making war with us, and be found in our realm at the beginning of the wars, they shall be attached without any harm of body or goods, until it be known to us, or our chief-justice, how our merchants be intreated there in the land making war against us; and if our merchants be well intreated there, theirs shall be likewise with us." And by 27 Edw. III. c. 17, merchants of a foreign state at war with us were allowed forty days, after proclamation of hostilities, wherein to remove from the kingdom themselves and their goods; and if that space of time were not sufficient, forty days more were to be conceded to them. Vattel (iii. 4, 63) denies that the right to confiscate the goods of an alien E. is a right inherent in a state by the law of nations, insisting that a sovereign having permitted foreigners to enter the state, and to continue there, had tacitly promised them full liberty and security for their return. Whatever be the principle, there is no doubt that the almost universal practice of modern nations has been to respect the property of individuals at the outbreak of hostilities. Provisions are frequently inserted into commercial treaties, stipulating that, in case of war, the subjects of the E. shall have time to depart, and even that they should be allowed to remain and carry on a peaceable trade. As to the practice in regard to EMBARGO and LETTERS OF MARQUE, see those articles. The right to confiscate the debts of the subjects of a hostile nation appears to rest on the same basis as that of the confiscation of other property. Trade between the subjects of two hostile powers is absolutely suspended during hostilities, unless permitted by express sanction; and the importation of articles particularly useful in war is contraband. All such articles, whether supplied by subjects of the E., or of another state, are seized and confiscated. See CONTRABAND OF WAR; see also PRIZE and PRISONERS OF WAR. On the subject of this article, see Grotius, *De Jure Belli et Pacis*, lib. iii. cc. 3 to 7; Vattel's *Law of Nations*, b. iii. c. 4 and 5; Kent's *Commentaries*, vol. i. c. 3.

ENERGICO, an Italian term in music, meaning with energy and force; with strong articulation and accentuation, and a marked powerful delivery of the single notes, without losing in distinctness of execution.

ENFANTIN, BARTHÉLEMY PROSPER, the chief representative of St. Simonism, and as such, usually styled père Enfantin, was the son of a banker at Paris, where he was born in the year 1796. He became a pupil in the *Ecole Polytechnique* in 1812, but was expelled in 1814, in consequence of his having joined the pupils who left school and fought against the allies on the heights of Montmartre and St. Chaumont. He was afterwards a commercial traveler in Russia, then a banker's clerk, and in 1825, became director of the *Caisse Hypothécaire*. About this time, he became a disciple of St. Simon, whose ideas he developed, after the death of their author, in the *Producteur*. After the July revolution, E. associated himself with M. Bazard for the active propagation of St. Simonism. Bazard preached it in its relations to philosophy and politics; E. mainly in its relations to the social state. Soon, however, a scism broke out between the two on the question of marriage and the relation of the sexes. Recognizing the "mobility" of the affections, E. affirmed that they ought to be "free," and of course pronounced against the ties of marriage. E.'s views were pushed so far, that government deemed it necessary to interfere on the grounds of public decency. The "supreme father" (as his disciples were wont rather profanely to call him) was, after a trial of two days, sentenced to two years' imprisonment, and to pay a fine of 100 francs. Being released at the expiration of a few months, E. went to Egypt, and, after an absence of two years, returned to France, and became a postmaster and farmer in the vicinity of Lyons. In 1841, he came to Paris, and was appointed a member of the scientific commission for Algiers, and on his return from Africa, wrote a sensible, interesting book, entitled *Colonisation de l'Algérie* (Paris, 1843). After the revolution of 1848, he edited the journal entitled *Le Crédit Public*, a paper retaining much of the old St. Simonian character, but which had to stop in 1850 for want of funds. E. afterwards held an important situation on the Lyons and Mediterranean railway. His principal works are his *Doctrine de St. Simon*, in conjunction with others (1830); his *Traité d'Economie Politique; La Religion Saint-Simonienne* (1831); *Moral; Le Livre Nouveau* (1832); *Correspondance Philosophique et Religieuse* (1847); *Correspondance Politique* (1849); *La Vie Eternelle, Passé, Présente, Future* (1861). He died May 31, 1864.

ENFEOFFMENT. See FEOFFMENT.

ENFIELD, a village in Hartford co., Conn., near the Connecticut river, and the New York, New Haven and Hartford railroad, 14 m. n. of Hartford; pop. of township, '70, 6,324. There are carpet factories and extensive powder-mills in the village, the latter said to be the largest in the world. In the town are two or three manufacturing villages, and a community of Shakers.

ENFIELD, a t. in Middlesex, England, 10 m. n.e. of London, noted as the place of manufacture of the Enfield rifle, now the Martini-Henry rifle; pop. '71, 16,054. In the place are the remains of a royal palace in which Edward VI. kept his court.

ENFIELD, WILLIAM, LL.D., 1741–97; an English dissenting preacher; minister in Liverpool in 1763, and subsequently in various other places. Besides many sermons, he published the *Preacher's Directory;* the *English Preacher;* *Institutes of Natural Philosophy, Theoretical and Experimental;* and articles in Aiken's *Biographical Dictionary.*

EN'FIELD RIFLE FACTORY. See SMALL ARMS FACTORIES, ROYAL.

ENFILADE' is a military term applied to a fire of musketry or artillery made in the direction of the length of a line of troops or a line of rampart. A besieging battery so placed as to send its shot along any part of the line of a fortification, and inside the parapet, does great execution in dismounting the guns, which thus present the largest surface to the balls. Hence the lines of rampart should be planned that their prolongations may fall in situations inaccessible to the enemy. Where this is not possible, the lines are either broken, or are protected by bonnets (q.v.), or by traverses (q.v.), or blindages (q.v.). In the siege of a fortress, the trenches of approach are cut in a zigzag, to prevent the defenders enfilading them from the walls.

ENFRANCHISE, ENFRANCHISEMENT, to make free; the admission to certain liberties or privileges. Thus, a person made a denizen of the country, or receiving the freedom of a city or burgh, is said to be enfranchised.

ENFRANCHISEMENT OF COPYHOLDS. See COPYHOLD.

ENGADINE', a famous valley in Switzerland, in the canton of Grisons, second only to the Valais in length, extends n.e. for about 50 m. along the banks of the Inn, from the foot of Mt. Maloja to the village of Martinsbruck. It is divided into two portions—that toward the s.w., called the Upper E., and that toward the n.e., the Lower Engadine. The latter is wild and bleak; pent up within narrow limits among the hills, and having a huge barrier of glaciers between it and Italy, its climate is dismal. Frost and snow occur in July, and winter prevails for nine months of the year. The Upper E. is more open, and possesses much fine meadow-land. The Inn, which enters the valley at its s.w. or upper extremity, and flows through it, has many towns upon its banks, the highest of which, Silvaplana, is about 6,000 ft. above sea-level, while the lowest, Martinsbruck, is 3,320 feet. The inhabitants devote themselves principally to the rearing of cattle; they also make cheese, and export it largely. More than one half of the young men emigrate at an early age, and betake themselves to continental capitals, where they often attain comparative wealth, in which case they almost invariably return, build a house in their native valley, and therein spend the remainder of their days. Pop. about 11,000, almost all of the Reformed or Calvinistic church. The language most generally spoken is the Ladin (a corruption of Latin), a Romanic tongue, but differing from the other Romanic dialects of the Rhaetian Alps, and bearing a resemblance to the Italian.

ENGAGEMENT, MILITARY, considered as a conflict between two armies or hostile forces, cannot be described within limits suitable for this work. Almost every term applicable to armies in the field bears relation, in some way or other, to a hostile engagement, and those terms will be found briefly noticed under their proper headings.

ENGAGEMENT, NAVAL, admits of more precise and terse illustration than a military engagement, because each ship of war is a unit in itself, bounded by a clearly marked watery margin from all the other ships of a fleet.

In the small war-vessels of ancient times, before the invention of gunpowder, a naval E. usually began by running the galleys violently against each other, to crush or sink the enemy by means of the beak or prow. The prows were, for this purpose, armed with brazen or iron points. On the deck was sometimes a kind of turret filled with soldiers, the probable precursor of the *forecastle* in modern ships; and there was also frequently a platform for accommodating swordsmen, slingers, and javelin-men. High and bulky ships, of no great length, were best for this kind of warfare. Sometimes a massive piece of iron or lead, called a *dolphin*, was let down violently from the yard-arm, to crush or break through some part of the enemy's vessel. The men fastened sickles to the end of long poles to cut the enemy's rigging and sails. Other means for carrying on a hostile attack were *battering-rams*—heavy maces with very long handles, stone-throwing machines, and grappling-irons.

In modern ships, preparations for an E. are made with the utmost coolness and precision. The boatswain and his mates communicate to all the crew the order to "clear for action." The men take their hammocks, lower them, tie them up, and carry them to the quarter-deck, poop, forecastle, and other parts of the ship, where they are stowed between a double netting above the gunwale, and form a partial defense against the enemy's musketry. The sails, yards, booms, bowsprit, etc., are secured by strong chains and extra ropes, to prevent or lessen disaster if they are shot away. The boatswain and the carpenter collect together, and place at hand all kinds of pieces of wood, iron, rope, and canvas that may be useful in quickly repairing shot-holes and other damage. The gunner and his mates examine the cannon and the filled cartridges, and see that all the implements for gunnery are at hand. The master and his subordinate officers look to the trim and state of the sails. The lieutenants visit all the decks, to see that obstructions of every kind are removed. When the E. is about to begin, the drums beat to arms. Every man repairs to his place. The marines are drawn up in rank and file on the quarter-deck, poop, and forecastle. The surgeon and his assistants are ready in the cockpit to amputate limbs, extract bullets, and dress wounds. Then begins the battle, which varies in its character according to the number and kind of ships on each side, the nature of the sea, the direction of the wind, and a multitude of

other circumstances. In the British navy, the order of battle for a fleet is ordinarily in two lines, each being divided into the starboard and port division or squadron. When the battle is ended, if it has been a severe one, the probabilities are that many men have been killed or wounded, decks and sides battered and splintered, cannon dismounted, rigging, masts, yards, and sails destroyed or torn. The whole ship's crew, except those disabled, then work hard to get the vessel back into trim; an attempt that frequently cannot be realized without aid from other ships, or from the resources of a port.

ENG AND CHANG. See SIAMESE TWINS (*ante*).

EN-GEDI (meaning in Hebrew "the fountain of the kid," and corresponding to the Arabic "Ain-Jidy") is the name of a wilderness, a mountain pass, a ruined village, and a perennial fountain on the w. side of the Dead sea, half way between its northern and southern ends. In the days of Abraham it was the site of a city named Hazezon-ta-mar, *cutting of palm trees*, doubtless with reference to the grove of trees which then grew around the fountain. In its strongholds was the home of the Amorites, who were, at that time, attacked and destroyed by the Assyrians and their allies. Here in "the city of palm-trees," at the time of the exodus from Egypt, a branch of the Kenites lived concerning whom Balaam said—"Strong is thy dwelling place, and thou puttest they nest in the rock." After the conquest of Canaan they left this fortress and went up to dwell with the tribe of Judah. Four hundred years later, David fled for refuge into the strongholds of En-gedi. When Saul heard this he "took 3,000 chosen men and went to seek David and his men on the rocks of the wild goats." Entering one of the numerous caverns, it proved to be the very one in the sides of which the fugitives were concealed. David, refusing to lift his hand against the king, and forbidding his followers to touch him, cut off the skirt of his robe, as proof of what he might have done, and let him depart. After David, Solomon celebrated in his "song of songs" the vineyards of En-gedi, which, as the ruins still show, were planted all along the terraced side of the mountain. About 1000 years later the Jewish sect of the Essenes, in their progressive efforts to isolate themselves from all the impurities of life, chose at last as their retreat the absolute solitude of the caverns around the fountain of En-gedi. Four hundred years afterwards there was a large village on the coast below the fountain, the ruins of which yet remain. And 1400 years later still (A.D. 1838), two American travelers on their way to the Dead sea, descending the mountain by a terrific pass, more difficult and dangerous than the heights of Lebanon or of the Alps, in zigzag directions, at very steep angles, over rock as smooth as glass but of irregular surface, first along ledges on the perpendicular face of the cliff, and then down the precipitous sides, came at length to the beautiful fountain, bursting forth a fine stream on a narrow shelf of rock and rushing down the steep descent of 400 ft. into the sea in a course hidden from view by the luxuriant thicket of trees and shrubs with which its waters have clothed the rocks. And on the rocks the wild goats still roamed, secure as they had done 3,700 years before, when the fountain was named.

ENGELBERT, SAINT, 1185–1225; in 1215, elector of the empire and archbishop of Cologne. He was regent in Germany while the emperor Frederick II. visited Italy. He reformed the clergy, aggrandized the church, and curbed the power of the nobles. Engelbert was murdered by his nephew, count von Isenberg, who was broken on the wheel, and his fellow conspirators, the bishops of Münster and Osnabrück, were excommunicated.

ENGELHARDT, JOH. GEORG VEIT, a learned German theologian, was b. 12th Nov., 1791, at Neustadt on the Aisch, and studied at Erlangen, where, in 1820, he was appointed extraordinary professor, and in 1822 ordinary professor of theology. He died 13th Sept., 1853. Patristic and mediæval dogmatics, and Neoplatonism, are the subjects which he has chiefly investigated. In 1820, he published at Erlangen a translation of the first *Ennead* of Plotinus; in 1823 appeared his translation of the writings ascribed to Dionysius the Areopagite. His *Kirchengeschichtchen Abhandlungen* (Erl. 1832), *Auslegung des speculativen Theils des Evangeliums Johannis durch einen deutschen mystichen Theologen* (Erl. 1839), and his contribution to the history of the mystical theology, entitled *Richard von St. Victor und Johannes Ruysbroek* (Erl. 1838), are works of great value, and have thrown a new light on many important points. Very useful, too, especially on account of the richness of their special notices, are his *Handbuch der Kirchengeschichte* (Erl. 1834), and *Dogmengeschichte* (Neustadt, 1839). E., in the course of his life, wrote many learned dissertations in the *Journal of Historical Theology*, among which may be specified his *Ueber die Hesychiasten*, and *Ueber Erasmus Sarcerius*.

ENGHIEN, LOUIS ANTOINE HENRI DE BOURBON, Duc d', only son of prince Henri Louis Joseph, Duc de Bourbon, was b. at Chantilly, 2d Aug., 1772. In 1789, he quitted France, and traveled through several countries of Europe. In 1792, he entered the corps of *émigrés* assembled by his grandfather, the prince of Condé, on the Rhine, and commanded the vanguard from 1796 until 1799. At the peace of Lunéville, in the year 1801, he went to reside at Ettenheim, an old château on the German side of the Rhine, not far from Strasburg, and within the territories of the duke of Baden. Here he married the princess Charlotte of Rohan Rochefort, and lived as a private citizen. When the conspiracy of the Bourbon princes, headed by Cadoudal, Pichegru, etc., against the

life and authority of Bonaparte, was discovered at Paris, the latter chose to believe that the duc d'E. was privy to it, although there was not a tittle of evidence to prove this. Perhaps Bonaparte was afraid that the valor and humanity of the last descendant of the great Condé might one day prove dangerous to his power. Be that as it may, he unscrupulously resolved to seize the person of the duke. On the night of the 17th Mar., 1804, the neutral territory of Baden was violated, and the château of Ettenheim surrounded with a body of soldiers and gendarmes. The duke, at first, endeavored to defend himself; but the force was too great to be opposed, and he, with several friends and domestics, was captured, and carried prisoner to Strasburg, and immediatly after to Vincennes. On the 20th of Mar., he was tried before a court-martial, consisting of eight officers, and after an examination of five hours, was condemned to death. Half an hour later, the sentence was put into execution. So cruel and audaciously criminal an act has fixed a deep stigma on the character of Bonaparte. M. Dupin has published the records of the trial, and shown the illegality of the proceedings of the military commission. This illegality was publicly acknowledged by gen. Hullin, the president of the court. After the restoration, the bones of the judicially murdered duke were taken up, and interred in the chapel of the castle at Vincennes.

ENGINEER AND ENGINEERING. Engineering, the business of the engineer, is the art of designing and superintending the execution of works of a constructive character, such as roads, railways, bridges, canals, harbors, docks, works for supplying water to towns, drainage and sewerage works, mining machinery, and the working of metals.

It may be divided into two kinds—civil and military. The military engineer is an officer in the service of government, whose duties are principally to construct fortifications, to make surveys for warlike purposes, to facilitate the passage of an army by the construction of roads and bridges; in short, to execute all engineering works of a military nature; but he is also, especially in this country, called upon to undertake many works which more properly belong to the business of the civil engineer, such as the survey of the country—called the ordnance survey—the inspection of public works, and, in short, all the duties of a government engineer.

The civil engineering profession is subdivided into several sections, according to the special nature of the employment of its members. The railway engineer projects and superintends the execution of railways and all the works in connection with them, such as the alteration of roads and streams, the construction of viaducts, bridges, cuttings, and embankments. The hydraulic engineer constructs the works connected with the supply of water to towns, the filtering of water, its collection in reservoirs, and its distribution through a town or district; the irrigation and drainage of tracts of country; the protection of low lands from inundation, and the use of water as a motive-power. The dock and harbor engineer has the management of all works connected with the sea or navigable waters, such as the construction of piers, breakwaters, docks, harbors, and light-houses. The mechanical engineer is principally concerned in the manufacture of machinery, the working of metals, the construction of ships, steamers, cannon, and all the various structures in which the metals bear a prominent part. Then there is the mining engineer, who discovers minerals and manages mines; there are engineers who are specially engaged in the drainage of towns, and many other less prominent divisions of the profession.

In all engineering works, the *contractor* takes a very important part; he executes the works from the designs, and under the direction and superintendence of the engineer, and on his ability and good management the success of undertakings very materially depends.

The engineering works of antiquity are both numerous and prominent, many of them remaining while all other traces of their constructors have been swept away. The most notable of the works belonging to very remote antiquity are the harbors of the Phenicians, the palaces and sewerage of Nimroud, and the pyramids of Egypt; next in order come the harbors of ancient Greece, the bridge of boats across the Dardanelles, made by Xerxes, to transport his immense army into Europe, and his canal across the isthmus of the peninsula of mount Athos. The buildings of ancient Rome next claim attention—its theaters, temples, baths, and aqueducts, some of which carried water from distances of more than 50 m. into Rome; its roads, bridges, and drainage-works vie in extent and magnificence with the most celebrated works of modern times.

From that period down to the commencement of the 18th c., the most extensive works executed are the canals, embankments, and other hydraulic constructions used by the Dutch for the purposes of inland navigation, and to protect their low lands from the sea; the canals of North Italy, the cathedrals and fortifications of mediæval Europe.

Civil engineering, as a distinct *profession*, may be said to have originated, in England, about the middle of the last century; since that time, the improvements in the steam-engine by James Watt, its subsequent application to the railway system by George Stephenson, and its use in navigation, have given a great impulse to commerce and civilization; which, in their turn, have created the necessity for the numerous and magnificent engineering works of modern times; such as the innumerable railways,

roads, and canals that intersect this and foreign countries; the bridges, water-works, docks, harbors, and vessels that facilitate our commerce and increase our comfort and prosperity. Among the most remarkable of these works may be mentioned the tubular bridges of the St. Lawrence and Menai strait, the Niagara railway suspension bridge, and the electric telegraph system, which covers this country and the seas and countries of Europe, and may, at some future time, connect us with the continents of America, Australia, and India. Among the more celebrated British engineers are the Stephensons, the Rennies, the Brunels, Telford, Smeaton, and Locke.

The education of those who would rise to eminence in the profession, must embrace a fair knowledge of pure mathematics and of the mixed sciences of natural philosophy, such as mechanics, hydrostatics, hydraulics, and optics. They should acquire a knowledge of the principles of projections, and should aim at being good draughtsmen and rapid and accurate arithmeticians.

Engineering is represented in this country by several institutions and societies, the principal of which is the London institution of civil engineers, established in 1818, "for facilitating the acquirement of professional knowledge, and for promoting mechanical philosophy;" there are also many schools and colleges throughout the kingdom in which engineering is made a special study.

In conclusion, it may be said that every day opens fresh fields to engineering science and labor; and that as the first beginnings of the art are lost in the obscurity of remote antiquity, so we see no termination to its usefulness and necessity.

The more important operations involved in engineering are treated of under such heads as BRIDGES, CANALS, AQUEDUCTS, EMBANKMENT, TUBULAR BRIDGE, ROADS AND ROAD-MAKING, RAILWAYS, RIVER, SUSPENSION BRIDGES, etc.

ENGINEERS, CORPS OF, organized in the United States in 1802, to consist of one col., one lieut.col., two majors, four captains, four first and second lieutenants, and cadets—the whole number not to exceed 20—to be stationed at West Point, and to constitute a military academy. In 1838, the corps was increased to 47 officers, and a corps of topographical engineers in addition was organized. In 1846, sappers, miners, and pontoniers (bridge builders) were added. In 1861, on the beginning of the rebellion, three additional companie s were provided for, and one of topographical engineers was added. This company was disbanded in 1863, and its officers sent to the corps of engineers. At present the corps has one chief, six colonels, 12 lieutenants, 24 majors, 30 captains, 26 first lieutenants, and 10 second lieutenants. The corps is a special arm of the service, charged with the selection and purchase of sites, and the constructing of fortifications; the examination and removal of obstructions in streams; with works of defense and attack at fixed places, besides important field duties in preparing for the movement of forces. The corps have also to plan and superintend harbor and river improvements; to make surveys and geographical explorations, etc. Until 1866, the engineer corps had the superintendence of the West Point academy, but since that year all branches of the service are admitted to their share of supervision.

ENGINEERS IN THE UNITED STATES NAVY, are commissioned officers having charge of the machinery of steam vessels. They must have a thorough practical education in the construction and management of steam machinery. In military law, they are considered non-combatants.

ENGINEERS, THE ROYAL CORPS OF, forms one component portion of the army of the British empire. A similar corps exists in all regular armies. It is the scientific and constructive branch, intrusted with the making and defending of all military *works*, and the attack and conquest of similar works belonging to an enemy. It is true that civilians are often employed to construct the buildings themselves, at a stated price; but the military engineers make the plans, and are responsible to the country for their efficiency. At the present time, for instance, and for a number of years past, contractors are at work on fortifications at Portsmouth and in other parts of the kingdom, but on plans and under orders for which the engineer department of the government is responsible.

The royal engineers of the United Kingdom form one regiment or corps. The officers, in time of peace, are scattered all over the world. There is no half-pay, except on *permanent* retirement; and no unemployed list. They have much wear and tear of body and mind, and are considered entitled to a competent retiring allowance at an earlier age than other officers. Their regular pay corresponds to the active pay of other officers of the same rank; but they exclusively receive in addition *extra* pay, amounting to one-half their ordinary pay when on duty at home, and equaling their ordinary pay when employed abroad or in the London district. There is an establishment of engineers in each military command, to conduct and superintend all the military buildings and works. The entire force is under a particular department of the war-office, that of the inspector-gen. of fortifications. Until the year 1763, the duties of military engineers were discharged by officers taken from the regular army. In that year, however, the corps of engineers was formed, greatly to the advantage of the military service. In 1783, it was made a *royal* corps, and a distinctive uniform adopted. Several companies of artificers were, in 1812, converted into sappers and miners, and placed under the engineers.

The non-commissioned officers and privates of this valuable corps are all workmen

who have learned some mechanical trade; hence their skill in all constructive operations. The ordnance survey has been intrusted to the corps. For many purposes, the men are *lent*, to attend to special and peculiar work; and at such times their emolument is always increased. They often buy their discharge, in order to go into civil employments, when the prospects are good. The men enlist for 12 years, with power to re-engage (if wanted) for nine more; but they can purchase their discharge at any time. They have to pay more for their discharge than other corps in the army, having received more instruction at the national expense. Officers intended for the engineers enter the royal military academy as cadets by open competition, and pass out from time to time for commissions. When in the corps, promotion is by seniority, the purchase system having never been introduced. The army estimates for 1878–79 provided for the following number of officers and men in the corps of royal engineers:

Officers	393
Non-commissioned officers	662
Rank and file	4,158
	5,213
Horses	423

The sum set down for their pay for the year was £232,319, which, however, does not include any commissariat charges. The head-quarters are at Chatham, where there are engineer barracks. The corps is grouped into battalions and companies. In addition to the numbers shown above, there are 432 officers of royal engineers serving in India, their subordinates being natives.

ENGINEERS, in the royal navy, are the persons who attend to the machinery on board the war-steamers. When such steamers were at first adopted, men were obtained from private engineering establishments, or from merchant-steamers. In 1847 and 1848, many changes were made, to induce skillful and steady men to enter the service, and to maintain better discipline. The higher grades of them were raised from the rank of *warrant* officers to that of *commissioned* officers of a civil branch. There are now the grades of chief inspector of machinery afloat, inspector of machinery afloat, chief-engineer, engineer, and assistant-engineer, the last rank being subdivided into two classes. All these are commissioned officers, and are strictly examined before admission; their rank and promotion being by selection, and dependent on skill, character, and length of service. A chief-engineer is expected to be able to make notes in the log of every particular concerning the engines and boilers; to draw rough sketches of the machinery, with figured dimensions fit to work from; to understand and manage everything relating to engines, boilers, and furnaces; to understand practical mechanism generally, and the principles of theoretical mechanism. The engineer and assistant-engineer are expected to possess, in a smaller degree, the same kinds of knowledge and skill. The pay varies from £511 for a chief inspector of machinery, down to £64 for a second-class assistant-engineer on harbor service.

The navy estimates for 1878–79 provided for 156 chief-engineers, and 637 engineers and assistant-engineers.

ENGLAND, the southern and larger section of the island of Great Britain, and the most important member of the United Kingdom of Great Britain and Ireland. The geography of E. will be found under the head of GREAT BRITAIN, the present article being confined to a sketch of its history previous to the union with Scotland.

Of the inhabitants of E. before the Christian era, little is known. In some of the ancient geographers, there are a few scattered notices of a rude population, with whom a limited commerce in tin was carried on by the Phenician merchants; and our information scarcely extends further. What is known of E. under the Roman occupation has already been embodied in the article BRITANNIA. An account of the country during the period intervening between the withdrawal of the Romans and the Norman conquest will be found in the article ANGLO-SAXONS.

When William of Normandy landed in E. to claim the crown which Edward the confessor had bequeathed to him, he found that the people had raised to the throne Harold, the son of a popular nobleman. The resources of the Saxons, however, had been wasted in domestic conflicts before the attack of William; and the battle of Hastings (1066 A.D.) gave E. with comparative ease to the Normans. The next 20 years saw the conquest completed, and nearly all the large landed estates of the Saxons pass, on every pretext except the true one, into the hands of the Normans. William claimed, indeed, to rule as sovereign by hereditary right, but this made little difference to the fact of conquest. All the high offices in the state and in the church passed into the hands of a new race. The Danes alone could retain either property or dignity. For long, some of the Saxons maintained an unequal resistance, retiring to the forests as the outlaws whose adventures furnished the materials for those favorite popular legends, where, as in Robin Hood, the spoiling of the richer classes is depicted as one of the chief virtues. In the course of time, the Normans were absorbed among the Saxons, their very language disappearing, though leaving many traces. From this union arose the English people and the English language as they now exist.

The union of the Normans with the Saxons was not fully effected so long as the

Normans retained their foreign possessions. In king John's reign, the whole of these were lost, excepting Guienne and Poitou. Long wars under Henry III. and Edward III., and his famous son, the Black prince, were continued, in the endeavor to regain the lost possessions; yet great victories like those of Cressy (1346 A.D.) and Poitiers (1356 A.D.) seemed to leave no result, for no sooner were the English armies withdrawn, than the population returned to their French allegiance. After Agincourt (1415 A.D.), Henry V., when he had forced himself to be acknowledged heir to the French throne, was virtually king of France, and held his court in Paris; yet, in a few years more, the rebellion of Joan of Arc came at a time when E. was weakened with the wars of the roses, and (1451 A.D.) nothing of foreign ground was left to this country excepting Calais.

To their efforts to conquer France, the Norman kings added others. Henry II. conquered Ireland (1171 A.D.), Edward I. conquered Wales (1285 A.D.), and had almost added Scotland to his dominions. The bravery of Wallace and Bruce defeated the armies of Edward II., his successor; and though the idea of the conquest of Scotland was always a favorite one, an opportunity for attempting it on a great scale never again presented itself.

The great struggles of the successors of William were with the ecclesiastics and with the barons. Sometimes in these the popular sympathies were with, and sometimes against the crown. The conqueror himself and his immediate successors had no difficulty in maintaining the superiority of the courts of justice over the ecclesiastics; but even a sovereign so bold and skillful as Henry II. was forced, after the outcry occasioned by the murder of Thomas-à-Becket (1170 A.D.), to yield the point. The right to nominate the higher ecclesiastics was also secured by the popes. The degradation of the English monarchy was at its lowest when king John consented (1213 A.D.) to hold the crown as a gift from Rome. The weaknesses of this monarch had good as well as evil results, for from him the barons won their great charter (1215 A.D.). From Henry II. something similar had already been gained; but it was the Magna Charta of John which firmly established two great English principles—that no man should suffer arbitrary imprisonment, and that no tax should be imposed without the consent of the council of the nation. Under Edward I., the famous statute that no manner of tax should be imposed without the common consent of the bishops, barons, and burgesses of the realm, was passed (1296 A.D.); and before the time of Henry VII., the foundations of parliamentary government had been laid.

The union of the houses of York and Lancaster under Henry VII. begins a new period in English history. Part of his reign was disturbed by Perkin Warbeck and other pretenders to the throne, in support of whose claims the turbulent nobles found vent for their restlessness. But the greater part of his long reign was distinguished from preceding reigns as a time of peace and economy. During it, men's minds ripened for the great events of the next reign. Henry VIII. succeeded, under the most favorable auspices. He found the alliance of his now important country courted by both of his great contemporaries, Francis I. and Charles V. But the interest of the foreign complications of the reign merges in the struggle between the courts of E. and of Rome. The origin of the contest was the divorce which Henry desired to have from Catharine of Aragon, his brother's widow, to whom he had been married by papal license. Cranmer and the English church pronounced the marriage to be null, but a formal decree of divorce by the head of the church was then thought necessary in Catholic Europe. Pope Clement and the consistory, influenced by Spanish counsels, delayed, by every possible means, the decision of the question. E., however, was ready enough to support Henry. Wickliffe and his adherents had done not a little to shake the attachment of the nation to a foreign spiritual authority, by preaching doctrines which dispensed with the necessity for it. A parliament met, when the commons took the significant step of presenting a long memorial of complaints against the church. The pope, still showing no signs of yielding, bills followed, declaring the king the head of the church; rendering the inferior clergy amenable to the civil courts; abolishing the payment of the first year's fruits of ecclesiastical livings to Rome; and perhaps a more important thing than any of these, declaring that no convocation should meet unless the king should summon it, and that no ecclesiastical canons should have force except with the king's consent. To these measures, the pope replied by refusing the divorce, and excommunicating the king (1533 A.D.). The breach thus became irreparable.

A new act was passed giving to the magistrates the power of judging in questions of heresy. The next step was the suppression of nearly 400 of the smaller monasteries. The subsidence of an insignificant popular reaction, incited by the lower clergy, was followed by the suppression of the great abbeys. All these changes, however, touched only matters of church government. On matters of faith, Henry and his parliaments were as orthodox as the most conservative could wish. They embodied the leading doctrines of Romanism, disputed by the Protestants, in an act of parliament, known among the people as "the bloody six articles," and enforced conformity under severe penalties.

Henry was succeeded by Edward VI. His reign was marked by the general progress which the reformation now made from questions of government to questions of doctrine. More thoroughly than ever the power of the clergy was sapped. The Book of

Common Prayer (1548 A.D.) deprived them of the mysterious authority which the use of a foreign language in worship gave them in the eyes of the people, and the 42 articles of the church of E. (1552 A.D.), the foundation of the present 39, denied, among other things, their power to work miracles in the elevation of the mass.

The next reign saw the inevitable reaction. The superstitions of the populace had been too rudely handled, and—as often happens before a crisis—there came a period of physical suffering. The conversion of cornfields into sheep-walks, induced by the high value of wool as an article of export, had thrown many out of employment, and the country was, moreover, infested with the crowd of vagrants whom the monasteries had been wont to maintain. The popular dissatisfaction coupled these things with the reformation. Thus the opportunity was prepared for the atrocities of the reign of Mary. The queen herself was interested, by her mother's honor and her own, to uphold the Romanist faith; and her gloomy temper, aggravated by her unhappy childless marriage, believed that it did true service to God when it gave the rein to the bigotry of Pole and Bonner. In her first parliament (1553 A.D.), the whole legislation of Edward VI. was repealed, leaving the church of E. one in ceremonial and doctrine with the church of Rome. Another parliament (1555 A.D.) repealed the legislation of Henry VIII., thus re-establishing the papal supremacy. Everything that the reformers had done was thus undone. Still the adherents of the reformation were numerous, and when legislation failed to convert them, the fires of Smithfield were tried. Hooper, bishop of Gloucester, was one of the first to suffer. Latimer, Ridley, Cranmer, followed, and the number who perished is not less than 300 by fire, and 100 by torture and the cruelties of confinement. Nothing more was wanted to turn the popular mind at once and forever from the church of Rome.

The accession of the Protestant princess Elizabeth came as a relief to the whole nation. The Romanists themselves were weary of the policy which made E. the tool of Spain, and were sickened with the cruelties which had been enacted. Elizabeth began by releasing from prison all confined on charges of heresy. Parliament followed (1559 A.D.) with acts restoring the royal supremacy over the church, and returning in general to the legislation of Edward VI. The prayer-book and the 39 articles were adjusted as they still exist. Fortunately for the country, the ministry of Elizabeth, guided by the able hand of Cecil, was one of peace. No opportunity was lost of aiding the Protestant cause throughout Europe; but Elizabeth had almost no open wars, and her long reign was disturbed by almost no domestic collisions. The mistake committed in detaining the queen of Scotland in an English prison, gave a constant incitement to disaffection among the adherents of the old faith, but no serious consequences ensued. Towards the close of the reign, Protestant and Catholic were alike patriotic in repelling the Armada (1588 A.D.). On the death of Elizabeth, the crowns of E. and Scotland were united.

The reign of James VI does not present much that is remarkable. The plot, for which sir Walter Raleigh suffered long afterwards, and the Gunpowder plot—the insignificant proportions of which were so magnified for factious purposes—disturbed the earlier years; and the close of the reign found the nation engaged in an unfortunate war to assist the king's son-in-law, Frederick, elector of Bohemia, against the emperor Ferdinand II. of Germany. But for the greater portion of the 23 years of the reign there was neither foreign nor domestic war. These years the king occupied industriously in rendering monarchy odious and contemptible. He lavished money upon unworthy favorites, and to supply his extravagance, openly sold the dignities of the peerage and the other honors of the state. His personal demeanor was vain, weak, and ridiculous; but in contrast with the insignificance of his talents was his extravagant conception of the extent of his royal prerogative. His conduct occasioned great discontent in parliament, and but for his timidity might have led to more serious consequences.

The misfortunes of Charles I. were the legitimate result of the principles of his father. Charles committed the mistake of repeating, in the 17th c., acts which the Plantagenet sovereigns had done with impunity in the 14th and 15th. One of his first acts was to exact a benevolence to carry on the war. Had he been successful, this might have been overlooked, but when the bad management of the duke of Buckingham lost the fleet off Rochelle, the indignation of the commons was without bounds. In place of taking measures to allay this feeling, the king dissolved the parliament, and resolved to govern without calling another. In 1630, he concluded peace, and for the next seven years, in council with Strafford and Laud, he carried on the government. Taxes were raised as before without parliamentary authority; and when the taxes failed, money was raised by selling to the Roman Catholics immunities from the penal laws against their worship.

Nevertheless, there were limits to these methods of raising money; and in 1637, when the king found himself involved in a war with Scotland, in consequence of his endeavor to introduce a liturgy there, he was compelled to call a parliament. The commons refused supplies, and were again dissolved. In 1640, the king once more summoned a parliament. He found the temper of the houses more indomitable than ever. In place of voting him supplies, they impeached his minister Strafford, and condemned him to death. The commons then presented a grand remonstrance to the king, embodying all the grievances the nation had suffered since the death of Elizabeth. Matters proceeded from bad to worse, till an open rupture came, and an appeal was made to arms. In Aug.,

1642, the king erected his standard at Nottingham, while the rebels took arms under the earl of Essex. The first conflict was at Edgehill, where the loss on both sides was severe and nearly equal. The fortune of war continued to vary, till at Marston moor it turned against Charles, and at Naseby, in June, 1645, he was finally defeated. He was executed on 30th Jan., 1649.

The government for the next four years was conducted by parliament. Meanwhile, Cromwell was rising into distinction, and power gradually fell from the hands of parliament into those of the military. In 1653, Cromwell had himself proclaimed "protector." He was now absolute monarch. He governed with a firm hand, and never was E. more respected abroad than during his time. In 1654, he concluded peace with Holland, and employed the gallant admiral Blake in an expedition against the Spaniards, which ended brilliantly for the English navy. But the nation grew as discontented with the government of Cromwell as it had been with that of Charles. After the death of the protector in 1658, and a short interval during which his son Richard held the office, parliament received with acclamations a proposal from Charles II. to return. In May, 1660, the populace clamored with delight on the royal entry to London of him who, a few years before, had fled from Worcester for his life.

While Clarendon was minister, the government of Charles II. was well conducted. A war with Holland was brought to a successful ending in the conquest of New York. On Clarendon's resignation, the government passed into the hands of the ministry known as the Cabal. They were as profligate and as careless as the king himself. A succession of cruelties against the Catholics, for which the pretended revelations of Titus Oates and his imitators furnished the excuse, betokened rather the wanton temper of the sovereign and the nation, than any zeal for the Protestant religion. The only act which reflects much credit on any portion of the reign was the passing, in 1679, of the *habeas corpus* act, designed more effectually to protect the liberty of the person. Strong efforts were made in parliament after that to pass the exclusion bill, the object of which was to exclude the duke of York, as a Roman Catholic, from the succession. To the great satisfaction of the king, parliament rejected the bill. In 1681, parliament was dissolved, and Charles II. never called another.

After this there was a change for the worse in the character of the government; from being wantonly indifferent, it became sullenly mischievous. Presbyterians and nonconformists were excluded from all offices. Among other arbitrary acts, may be mentioned the recall of their charters from London and many of the other principal cities, which were only restored, with diminished privileges, on payment of heavy fines. Conduct such as this made men more than ever afraid of the succession of the king's brother. A conspiracy to secure the succession to the duke of Monmouth, an illegitimate son of the king, was formed. Lord Howard betrayed the conspiracy, and among others who suffered death for it were lord Russell and Algernon Sidney.

When the king died, in 1685, James II. succeeded amid universal dissatisfaction. Monmouth's attempt to seize the throne, however, was mismanaged, and failed. The punishment of those who had aided his rising formed an occasion for the perpetration of great cruelties by Jeffreys, then chief-justice of England. In the meantime, nothing could be fairer than the king's language. He issued a declaration in favor of general toleration, and announced that the penal laws against Catholics were no longer to be enforced. A second declaration to the same effect was issued, but he went further, and added to it an order that the clergy should read it in all churches. The archbishop of Canterbury and six bishops presented an address to the throne, humbly setting forth that their duty to maintain the Protestant establishment would not permit them to give obedience to the royal mandate. For this they were indicted as guilty of sedition. The trial of the bishops (1688 A.D.) was the turning-point of James's career. It created immense excitement, and when the jury returned a verdict of not guilty, even the soldiers joined in the tumultuous rejoicings.

William, prince of Orange, who had married Mary, the eldest daughter of the king, had long been intriguing with the malcontents. He now landed in E. with a small body of troops. The soldiers, the leading nobles, even the king's own children, joining the prince, the king fled to France. Parliament then settled the crown jointly on William and Mary for life. James, with the assistance of Louis XIV., made one effort to regain his throne. He landed in Ireland, where the lord lieutenant, Tyrconnel, was devoted to his cause, and managed to raise an army. William defeated him at the battle of the Boyne; and the contest was soon after this terminated by the second flight of James to France. So easily was the great revolution of 1688 effected.

The domestic government of William was marked by his efforts to introduce a general toleration; but of his foreign administration, which led the country into costly wars, it is hardly possible to speak in very favorable terms. To reduce the threatening power of France, E., in alliance with Holland and Germany, embarked in a protracted contest. Its termination at the peace of Ryswick, in 1697, brought to E. nothing beyond an increase of reputation. William died in 1702.

Under queen Anne, the war with France was renewed, and the duke of Marlborough's splendid victories of Oudenarde, Blenheim, and Ramilies were achieved. With these the history of E. as a separate state closes. In 1707, the long-wished-for union with Scotland was accomplished; and after that, Great Britain, united under one legislature,

as well as under one crown, has a common interest among nations, and therefore a common history.

A table of the English sovereigns is appended, beginning with Alfred, and continued, for convenience' sake, to the present time:

	Began to Reign.	Years of Reign.
ANGLO-SAXON LINE.		
Alfred, king of Wessex	871	30
Edward I., king of Wessex, Mercia, etc	901	24
Athelstan, king of England	925	15
Edmund I	940	6
Edred	946	9
Edwy	955	4
Edgar	959	16
Edward II	975	3
Ethelred	978	38
Edmund II	1016	1
DANISH LINE.		
Canute	1017	19
Harold I	1036	3
Hardicanute	1039	2
SAXON LINE.		
Edward III	1041	25
Harold II	1066	..
NORMAN LINE.		
William I	1066	21
William II	1087	13
Henry I	1100	35
HOUSE OF BLOIS.		
Stephen	1135	19
PLANTAGENET LINE.		
Henry II	1154	35
Richard I	1189	10
John	1199	17
Henry III	1216	56
Edward I	1272	35
Edward II	1307	20
Edward III	1327	50
Richard II	1377	22
HOUSE OF LANCASTER.		
Henry IV	1399	14
Henry V	1413	9
Henry VI	1422	39
HOUSE OF YORK.		
Edward IV	1461	22
Edward V	1483	..
Richard III	1483	2
HOUSE OF TUDOR.		
Henry VII	1845	24
Henry VIII	1509	38
Edward VI	1547	6
Mary	1553	5
Elizabeth	1558	45
STUART LINE.		
James I	1603	22
Charles I	1625	24
Commonwealth	1649	10
STUART LINE.		
Charles II	1660	25
James II	1685	3
HOUSE OF ORANGE.		
William and Mary	1688	14
STUART LINE.		
Anne	1702	12
BRUNSWICK LINE.		
George I	1714	13
George II	1727	33
George III	1760	60
George IV	1820	10
William IV	1830	7
Victoria	1837	..

ENGLAND, CHURCH OF. A brief sketch of the origin and early history, as well as an outline of the doctrines and form of government of this church, will be found under the head ANGLO CATHOLIC CHURCH. See also the articles AUGUSTINE and DUNSTAN. Up to the time of the reformation, ecclesiastical affairs would be more properly described as the history of the church *in* England; from that period the church *of* England dates her existence. She, however, retains so much of antiquity, and her institutions, laws, and formularies are so interwoven with the history of the past, that it would be impossible to have any correct or connected view of them, and of her *connection with the state*, her characteristic feature, without at least glancing rapidly over the leading events between the conquest and the reign of Henry VIII. During the three centuries from the Norman conquest (1066) to the preaching of Wickliffe (1356), her history can be regarded only as a continual struggle between the ecclesiastical and civil power, and there would be little else to describe than the methods by which the miter triumphed over the crown, and the crown invaded the rights and property of the church. In the time of William I., nearly half the country was in the hands of spiritual persons. He ejected the English clergy, and supplanted them with Normans; and although he was possessed of full power over the church, yet in his reign were sown the seeds of future papal encroachments. Papal legates were then first introduced into England, and the ecclesiastical courts separated from the civil. From this time, the increased influence of Rome may be traced to the defective titles, the usurpations, and the violent conduct of the kings. Thus, the defective title of Henry I. made him seek popularity by recalling the primate Anselm, who had incurred the displeasure of his brother William, and had fled the country. Anselm was devoted to the pope, who had espoused his quarrel, and refused to do homage to the king for the temporalities of his see, till at length Henry found himself obliged to surrender the right of *investiture*. Thus, too, Stephen's usurpation opened the way for further encroachments; and Henry II., who found the power of Rome greatly augmented, helped to extend it further, by accepting a grant of Ireland from the pope. Then followed the opposition of Thomas-à-Becket, which arose out of the question of the punishment of ecclesiastics by the civil power. For the moment, it seemed that the quarrel was healed by the *constitutions* agreed on at Clarendon (q.v.), but it broke out more violently than ever. The pope discharged Becket from his oath, and condemned the constitutions. Becket had fled from the kingdom: and his subsequent return, murder, and canonization, all tended to strengthen the authority of the church. It was not, however, till the reign of John, when England was laid under an interdict, and the king resigned his crown to the pope, that the papal encroachments rose to their height: and the weak reign of Henry III., which followed, did nothing to abate them. Edward I. gave a check to the power of the clergy, subjected them to taxation, and passed the statute of Mortmain (1279), which prohibited

the transfer of land without the king's consent. There is little to be said as to innovations in doctrine during these three centuries; but it may be noted, that about the middle of this period, viz., 1213, the council of St. John Lateran declared transubstantiation, or the bodily presence of Christ in the consecrated elements, to be a tenet of the church.

It was in 1356 that a new period commenced. Wickliffe then published his first work, entitled *The Last Age of the Church*, directed against the covetousness of the church of Rome. His doctrines correspond in many points with those now taught by the church of England, but he differed from her in regard to the necessity of episcopacy, which he rejected; he also believed in purgatory, and enjoined prayers for the dead. His chief objects of attack were the papal indulgences, and the doctrine of transubstantiation. It has been observed concerning the condemnation at Oxford of Wickliffe's opinions with respect to the latter, that "this was the first plenary determination of the church of England in the case, so that this doctrine, which brought so many to the stake, had but with us 140 years' prescription before the times of Martin Luther." In a limited sense, he upheld the efficacy of the seven sacraments. Wickliffe had a large body of followers. They were called *Lollards*, probably from a German word, *lullen*, to sing with a low voice. The storm of persecution which he escaped by death, fell upon them. Henry IV. thought it necessary to fortify his usurped position by assisting the bishops against the Lollards; and from this time to the reformation, there was an uninterrupted succession of confessors and martyrs. Sir John Oldcastle, lord Cobham, was the most illustrious of these sufferers. Fox gives a detailed account of nearly 20 individuals burned for heresy between the death of lord Cobham and 1509, when Henry VIII. ascended the throne. To some extent, the blood of these martyrs was the seed of the Reformed church; but we must not overlook the "hidden seed" which was growing secretly, from the time that Wickliffe gave to his countrymen a translation of the Scriptures in their own tongue. The progress of learning, and especially the study of Greek, led to a better understanding of the sacred books, whilst the invention of printing (1442) caused a wider circulation of them.

The above causes, however, would probably have proved insufficient to produce the great change which was now impending, had not Henry VIII.'s divorce from Catharine of Spain led to a quarrel between him and the pope, which ended in the total abolition of the papal authority within the kingdom. Then began the REFORMATION in earnest. For the details of that great event, consult the article under that head, and the lives of such men as Wolsey, sir Thomas More, Fisher, Clement, Luther, Cromwell, Cranmer, Latimer, and Ridley, etc. From this period may be dated the existence of the church of England as a separate body, and her final separation from Rome. For the opinions of the church in Henry's reign, two important books which were then published should be consulted—viz., the *Bishop's Book*, or the *Godly and Pious Institution of a Christian Man*, and the *King's Book*, which was a republication of the same in a more perfect form in 1543, and called *The Necessary Erudition for any Christian Man*, and was called the *King's* book because put forth by royal authority. A book of *Articles devised by the Kinges Highnes Majestie to stablyshe Christen Unitie*, should also be consulted. It has been stated in the article ANGLO-CATHOLIC CHURCH, that the reformation in *doctrine* did not make much progress in Henry's reign; from these books, it will be seen that it was rather retrograde. The monks, too, who were dispossessed at the dissolution of the monasteries, were dispersed amongst local cures, and kept alive the old opinions, and the lower orders were not as yet favorable to the new doctrines. Cranmer was the leader and presiding genius of the reformed opinions; and the youth of Edward VI. left the king pliant in the hands of the archbishop. The book of Homilies, put forth in 1540, the New Communion Service and Catechism in 1548, the first Book of Common Prayer in 1549, and the Forty-two Articles in 1553, all bear the impress of his hand, and it was these which advanced and fixed the doctrines of the reformation. Nor was the temporal authority idle on the same side—Bonner and Gardiner were committed to prison, and both were deprived of their bishoprics. In fact, the way in which all the institutions of the church of England were established in Edward VI.'s reign by the help of the civil magistrate, have brought upon her the charge of Erastianism. The civil power had just delivered her from a foreign tyranny; and when the weak health of the young king, the known sentiments of his successor, Mary, the ignorance of the common people, and the interested views of the old clergy, are considered, it cannot be a matter of surprise, still less of blame, that the same arm was relied upon for the establishment of the new forms of religion.

Although Mary promised at her accession that she would put constraint on no person's religion, her promise was not kept. Bonner and Gardiner were restored; the Book of Common Prayer and Catechism were declared heretical; the kingdom was reconciled to the see of Rome; a persecution of the chief reformers commenced—Rogers was burned at Smithfield, Hooper at Gloucester, Saunders at Coventry, Taylor at Hadley. The prisons were filled with "heretics;" many fled beyond sea; some purchased safety by an outward conformity. Cranmer, Latimer, and Ridley perished in the flames at Oxford. Cardinal Pole was made primate. One benefit was conferred on the church by Mary—she surrendered all the church lands, as well as the first fruits and tenths, which had been seized by Henry. At last the death of Mary, with which that of the

cardinal was all but simultaneous, delivered the church from its oppressors. The passing of the *act of uniformity* in the first year of Elizabeth's reign, restored the common prayer-book to general use, and enjoined the same dresses as were in use at the time of the first prayer-book of Edward VI. All the bishops except one, Kitchin of Llandaff, refused to take the oath of uniformity, and were ejected from their sees to the number of 14 (the eleven remaining sees were vacant by deaths), and 175 other beneficed clergy were deprived for the same cause—no very considerable number, when it is remembered that there were then 9,400 benefices in England. There was some difficulty in filling up the vacant bishoprics, and perhaps some slight informalities. Matthew Parker was made archbishop of Canterbury. For the refutation of the fable of the NAG'S-HEAD CONSECRATION, see the article under that head. In 1562, the Thirty-nine Articles were finally reviewed and subscribed. These, with the Book of Common Prayer, are the tests of orthodoxy in the church of England.

But what was done to satisfy the scruples of Protestant non-conformists? An attempt in this direction was made in the reign of James I. at the Hampton Court conference (q.v.). The result was another review of the common prayer-book; and this, with the new translation of the Bible, and the passing of the canons of 1604, were the principal ecclesiastical events of James' reign. These canons received the sanction of the crown, but not that of parliament; they are not, therefore, binding on the laity, but they are still binding on the clergy to some extent, and they regulate the practice of the ecclesiastical courts, and are the only rule, on some points, to which the bishops and clergy can appeal. See the articles LAUD, and SCOTLAND, CHURCH OF, for the events of Charles I.'s reign. The great rebellion overthrew both church and state. The bishops were declared "delinquents," robbed of their property, and abolished; and the clergy were ejected from their benefices. Laud was put to death in 1645. The church of England had no corporate existence during this interval. With the restoration of the monarchy, 1660, came the restoration of the church. The reaction from Puritanism to Prelacy was complete. Attempts were made, but with small success, to win over the Puritan leaders; bishoprics were offered to Baxter, Calamy, and Reynolds; but the last only accepted. The Savoy conference (q.v.) was an unsuccessful, perhaps insincere attempt to comprehend the non-conformists in the established church. But the demands of the Presbyterians were most immoderate. Baxter went so far as to propose the substitution of an entirely new book of his own composition, in the place of the common prayer-book. After the failure of the Savoy conference, this was once more reviewed; and a new act of uniformity in 1662 made its use, as it now stands, compulsory in all the churches.

The church of England passed through one more critical period before reaching that tranquillity in which, for upwards of a century, she slumbered too securely. In 1687, James II. published the famous declaration of indulgence, which filled up the measure of popular discontent, and finally cost him his crown. Although by this declaration, which was perfectly illegal, liberty of conscience was permitted to all his subjects, it was clearly understood that the liberty was intended only for the papists. The nonconformists refused to accept the treacherous boon. Eighteen bishops out of twenty-five refused to publish the declaration, as ordered, in their dioceses. Seven of them—Sancroft, Lloyd, Ken, Turner, Lake, White, and Trelawny—drew up a remonstrance to the king; they were summoned before the privy council, and sent to the Tower. The whole city was in commotion; and great was the rejoicing when, on being brought to trial in Westminster hall, they were acquitted. On the 5th of Nov. following, 1688, the prince of Orange landed in England. It is worthy of remark, that out of these seven bishops three refused to swear allegiance to him, and were joined by a considerable number of the clergy; these were called Non-jurors. In the first year of William and Mary's reign, the toleration act was passed, and dissent ceased to be illegal. Another attempt was made to comprehend the nonconformists in the church, but the lower house of convocation was in no tolerant mood, and the attempt failed, but chiefly in consequence of the disturbances in Scotland. In 1717, convocation was dissolved. After slumbering for nearly 140 years, it was once more called into life and action in the province of Canterbury in 1853, under the ministry of the earl of Aberdeen, and a few years later the convocation of York also took advantage of the liberty accorded by the crown on the advice of this government. See CONVOCATION.

That the church of England, after fighting for its very existence against popery on the one hand, and against Puritanism on the other, should have subsided into inactivity during the dull reigns of the Georges, is less a matter of surprise than of regret. The peaceful enjoyment of her temporalities in a dull, irreligious, not to say infidel age, may easily account for, though it cannot excuse, her idleness. But that in the rise of John Wesley, 1730, she should have failed to see a grand opportunity for herself, is a matter of both surprise and regret; she, however, let it pass; perhaps she can hardly hope that such another will ever again present itself. The utmost that can be hoped is, that she has seen her error. The next important event in the history of the church is the act of union, which came into effect on the 1st of Jan., 1801, and united the churches of England and Ireland in all matters of doctrine, worship, and discipline. The reformation had made some progress in Ireland under Edward VI. Five Protestant bishops were appointed in 1550, and the English Bible and liturgy were introduced in 1551; but

from a variety of causes, the reformed doctrines have never found much acceptance with the native population; and although a Protestant church was established by law, it was and is the church of the minority (see IRELAND). In 1635, the English articles were received; and in 1662, the English book of common prayer was adopted by convocation. Before the political union of the countries, the two churches were in full communion. By an act of the imperial parliament in 1833, ten of the Irish bishoprics were suppressed, and the funds thus obtained were applied to the augmentation of small livings and the building and repair of churches. There are now twelve Irish bishops. But in 1869, the Irish church was disestablished and disendowed; and this branch of the Anglican community now stands in much the same relation to the church of England as does the Episcopal church in Scotland.

In later times, three great controversies have shaken the English church, which have led to some great reforms, some internal divisions, and the secession of some members to Rome, of a few to the ranks of dissent. These were the Tractarian, the Gorham, and the Essays-and-Reviews controversies. The former was occasioned by some tracts which began to be published at Oxford in 1833, the object of which was to revive something of the spirit of Catholic antiquity, and reform the abuses and slovenly practices which had crept into every part of the church system. See TRACTARIANISM. The Gorham controversy (q.v.) related to the doctrine of baptismal regeneration. The Tractarians are accused of Romanizing tendencies; and their views, when carried to extremes, undoubtedly lead in that direction, as is proved by the numerous secessions to that church. With the extreme low church party, episcopacy is rather an expedient than a necessary form of church government. They think but little of the efficacy of sacraments, and deny that regeneration necessarily takes place in infant baptism. Justification by faith, the atonement of the cross, and the Calvinistic doctrines on election, are their leading topics in preaching. See the lives of SIMEON and of VENN for the views of this party.

The Essays-and-Reviews controversy (so called from a book thus named) concerned what are called BROAD CHURCH views, which are attributed to men of the Arnold school, and the followers of Mr. Maurice (q.v.). Those who hold them can scarcely be called a party, and are, indeed, unwilling to be so considered; but if their position must be defined, they might be described as a party between, and somewhat antagonistic to, both the high and low church parties. The high church party insist on the authority of the church and priesthood, the efficacy of sacraments when rightly received, and the necessity of apostolical succession in the matter of orders, and in their general teaching they take the prayer-book as the exponent of Scripture. They are scrupulous in observing the rubrics, and have done much to revive the practice of daily prayer in the churches, and the observance of the festivals. Order, unity, antiquity, and catholicity are what they profess to have in view. See RITUALISM.

There are at present, in round numbers, 13,000 benefices in England and Wales, of which a large number are new districts, which are being continually formed out of the old large and overpopulous parishes. These districts are called perpetual curacies, or incumbencies, and for the most part are but very slenderly endowed. The old benefices are either rectories, where the incumbent receives the *great* or corn tithes, or vicarages, where he receives the small tithe only. The great tithes had anciently been bestowed upon the neighboring monasteries, who undertook the cure of the souls and appointed vicars for the purpose, who lived on the small tithes and the offerings of the people. At the dissolution of the monasteries, many of the great tithes were given to laymen, and laymen now extensively hold them, and some to endowed colleges. The endowments were all by private beneficence, and there is no tenure so ancient as that by which the parish church holds her property. The aggregate amount was ascertained by the commission appointed in 1830 to be as follows: Bishops, £181,631; deans and chapters, £360,095; parochial clergy, £3,251,159; total annual revenue, £3,792,885. The value of the property of the Irish church was in 1869 estimated by Mr. Gladstone at £16,000,000. The church rates, amounting to £500,000 annually, were no part of the minister's endowment; they were exclusively devoted to the repairs of the church fabric, and the warming, lighting, cleaning, etc., of the church; and were under the exclusive control of the church-wardens. Of these there are two in each parish, one generally nominated by the minister, the other elected by the parishioners. The payment of church rates is no longer compulsory.

The church of England has three orders of clergy—bishops, priests, and deacons. Generally, a degree at one of the English universities, or of Dublin, is required in a candidate for orders; but in Wales and some of the more populous districts, this condition is dispensed with. There are two archbishops (Canterbury and York) and 28 bishops in England; besides 2 archbishops and 10 bishops in Ireland. The archdeacons and rural deans assist the bishops in the management of their dioceses. The deans and canons rule the cathedrals with but slight power of interference on the part of the bishops.

The patronage of the church is in a great variety of hands—in the crown, the bishops, the nobles, and the gentry, and incorporate bodies such as colleges and cathedrals. Advowsons and next presentations may be sold as property, but a presentation may not be sold when a living is vacant. A clergyman is "presented" to his living by the

patron; he is admitted and inducted by the bishop or his appointee; he must "read himself in," i.e., he must read the Thirty-nine Articles after the morning or evening prayer within two months after induction. The bishop may refuse institution on the ground of false doctrine or immorality; but an appeal lies to the Arches court and the head court of appeal.

The Episcopal church in Scotland is not, politically speaking, in union with that of England. But an act of parliament, passed in 1864, has taken away many restrictions imposed on Scottish Episcopalians after the battle of Culloden; and clergy ordained by Scotch bishops may now, under some slight restrictions, be presented to benefices in England. Events connected with the colonies have also drawn these two communions into closer alliance; and some bishops, selected by English authorities for foreign parts, have been consecrated in Scotland.

The above sketch has been largely drawn from Short's excellent *History of the Church of England;* see also Marsden's able *Dictionary of Christian Churches and Sects*, and Hardwick; also Fuller's *Church History*, Collier, Strype, Mosheim, Burnet, and Clarendon. Among the great divines whose works should be consulted for further information regarding the views of the church, may be named Barrow, Pearson, Hooker, Jeremy Taylor, Lightfoot, Hammond, Sancroft, South, Tillotson, bishop Butler, Atterbury, Bull, Sherlock, and others.

ENGLAND, JOHN, D.D., 1786–1842; b. Ireland, educated at Carlow college, and took orders in the Roman Catholic church. In 1820, he was appointed bishop of Charleston, S. C., where he founded the *Catholic Miscellany*, the first publication of that church in the United States. He was a learned and zealous prelate, efficient in his office, but kindly disposed towards those of other communions, and was held in general esteem.

ENGLAND, NEW. See NEW ENGLAND.

ENGLANTÉ, in heraldry, is bearing acorns or other similar glands.

ENGLE, FREDERICK, 1799–1868; b. Penn.; midshipman in 1814, rising to rear-admiral in 1866, when he was retired. He served with distinction in the Mexican war and in the war of the rebellion.

EN'GLESHERY, EN'GLESBURY, i.e., being an Englishman. The presentment of Engleshery is thus explained, Hale's *Pl. of Crown*, p. 446: "Anciently, there was a law introduced by Canutus the Dane, that if any man were slain in the fields, and the manslayer were unknown, and could not be taken, the township where he was slain should be amerced to 66 marks; and if it were not sufficient to pay it, the 100 should be charged, unless it could be made appear before the coroner, upon the view of the body, that the party slain was an *Englishman;* and this making it appear was various according to the custom of several places, but most ordinarily it was by the testimony of two males of the part of the father of him that was slain, and by two females of the part of his mother." William the conqueror continued this law. Presentment of E. was taken away 21 Edw. III. st. 1. c. 4.

EN'GLEWOOD, a village and township in Bergen co., N. J., 14 m. n. of New York, on the New Jersey Northern railroad, near the palisades. It is occupied chiefly by the families of men who do business in New York; has good hotels, several churches, and a classical institute. It is noted for fine scenery and cultivated society.

ENGLISH, forms the first part of several geographical names.—1. English cove is a bay of the Pacific ocean, on the s.w. coast of New Ireland, in lat. 4° 54′ s., and long. 152° 35′ east.—2. English harbor, on the s. coast of Antigua, is one of the best havens in the West Indies. It is situated in lat. 17° 3′ n., and long. 61° 45′ west.—3. English harbor is on the Pacific shore of Costa Rica, in Central America, lying in lat. 8° 50′ n., and long. 83° 55′ west.—4. English river is an estuary on the w. side of Delagoa bay, an inlet of the Indian ocean, in Africa. It is about lat. 25° 58′ s., and long. 32° 36′ east.—5. English river, otherwise known as Mississippi or Great Water, enters Hudson's bay from the w., at fort Churchill, about lat. 59° n., and long. 94° w., after an estimated course of 630 miles.

ENGLISH, GEORGE BETHUNE, 1787–1828; b. Mass.; graduated at Harvard, and was a member of the Boston bar, but finally studied divinity. He published *The Grounds of Christianity Examined*, a work favoring Jewish views. After editing a paper in the west, he became a lieut. of marines, and went on service in the Mediterranean, resigned his commission, became a Mohammedan, joined the army of Ismail Pasha in 1820, and served in the artillery in the expedition against Sennaar. He was subsequently agent for the United States government in the Levant, returning home in 1827. He published *Narrative of the Expedition to Dongola and Sennaar.*

ENGLISH, THOMAS DUNN, b. Philadelphia, 1819; studied medicine and law, but soon devoted his whole attention to literature, editing newspapers and magazines, and writing novels, dramas, poems, etc. His song of *Ben Bolt* is widely known. Of late years he has been practicing as a physician, though still a frequent contributor to current literature.

ENGLISH, WILLIAM H., b. Ind., 1822. He studied law, and in 1843 was chosen clerk of the Indiana house of representatives. In 1851, he was made speaker of the

legislature, and in 1852 was elected to congress, holding his seat till 1860, when he retired from active political life. His chief title to distinction, however, is his nomination for vice-president of the United States by the democratic national convention at Cincinnati, June, 1880.

ENGLISH or BRITISH **CHANNEL** (*La Manche* or the *Sleeve* of the French, and the *Oceanus Britannicus* of the Romans) is the narrow sea which separates England and France, having on the n. the English counties of Kent, Sussex, Hants, Dorset, Devon, and Cornwall; and on the s. the French provinces of Artois, Picardy, Normandy, and Bretagne. On the e., it joins the North sea, at the strait of Dover, where it is narrowest, being only 21 m. wide from Dover to cape Grisnez. From this strait it runs w.s.w. for 280 m., and joins the Atlantic ocean at the Chops, with a breadth of 100 m. between the Scilly isles and Ushant isle. With an average breadth of 70 m., it is 90 m. wide from Brighton to Havre; 60 m. from Portland Point to cape La Hague; 140 m.—its greatest breadth—from Sidmouth to St. Malo; and 100 to 110 m. w. of the latter line. It occupies 23,900 sq. geographical m., and includes the Scilly isles, Channel isles, Ushant isle, isle of Wight, and many islets and rocks, especially off the coast of Bretagne. It is shallowest at the strait of Dover, where a chalk-ridge at the depth of 12 to 30 fathoms joins England and France. W. of this, it deepens to 60 fathoms, with some banks at 3 to 5 fathoms, and some hollows 5 to 30 fathoms deeper than the parts around. A coarse gravel covers the bottom. The English coast-line of the E. C. is 390 m. long, with an inshore depth of 12 to 55 fathoms, and the French coast-line of the E. C. is 570 m. long. Westerly winds prevail in the E. C., and the current, though imperceptible, is always from w. to east. The E. C. abounds in fish, of which the chief are pilchard, mackerel, and oysters.

ENGLISH CONSTITUTION. See PARLIAMENT.

ENGLISH DRAMA. See DRAMA.

ENGLISH LANGUAGE, which is now spoken by nearly 80 millions of the earth's inhabitants, is in its vocabulary one of the most heterogeneous that ever existed; a fact, the causes of which are to be traced in the history of England (q.v.). Its composition and grammatical character are thus described by M. Müller in his *Lectures on the Science of Language* (1861). "There is, perhaps, no language so full of words evidently derived from the most distant sources as English. Every country of the globe seems to have brought some of its verbal manufactures to the intellectual market of England. Latin, Greek, Hebrew, Celtic, Saxon, Danish, French, Spanish, Italian, German—nay, even Hindustani, Malay, and Chinese words—lie mixed together in the English dictionary. On the evidence of words alone, it would be impossible to classify English with any other of the established stocks and stems of human speech. Leaving out of consideration the smaller ingredients, we find, on comparing the Teutonic with the Latin, or Neo-Latin, or Norman elements in English, that the latter have a decided majority over the home-grown Saxon terms. . . . M. Thomerel, who counted every word in the dictionaries of Robertson and Webster, has established the fact, that the number of Teutonic or Saxon words in English amounts to only 13,230 against 29,853 words which can either mediately or immediately be traced to a Latin source. On the evidence of its dictionary, therefore, and treating English as a mixed language, it would have to be classified together with French, Italian, and Spanish as one of the Romance or Neo-Latin dialects. Languages, however, though mixed in their dictionary, can never be mixed in their grammar. . . . We may form whole sentences in English consisting entirely of Latin or Romance words; yet whatever there is left of grammar in English bears unmistakable traces of Teutonic workmanship. What may now be called grammar in English, is little more than the terminations of the genitive singular and nominative plural of nouns, the degrees of comparison, and a few of the persons and tenses of the verb. Yet the single *s*, used as the exponent of the third person singular of the indicative present, is irrefragable evidence that in a scientific classification of languages, English, though it did not retain a single word of Saxon origin, would have to be classed as Saxon, and as a branch of the great Teutonic stem of the Aryan family of speech." See LANGUAGE.

In tracing the growth of the E. L., the history is usually divided into *four* leading periods: the *Anglo-Saxon period* (440 A.D. to 1066 A.D.); the *Semi-Saxon period* (from 1066 A.D. to 1250 A.D.); the *Early English period*, comprising the two periods of *old* and *middle English* (from 1250 A.D. to 1550 A.D.); and the *Modern English period* (from 1550 A.D. to the present time). But this nomenclature and these divisions are now impugned by an increasing number of scholars, who affirm, not without reason, that English was always English, and never "Anglo-Saxon;" that the fact of its being inflected in the period before the Norman conquest, and losing most of its inflections in later times, is no reason at all for speaking of it as if it were two or even three different languages, and that we have no warrant in the usage of the inflected period for calling our forefathers or their speech anything but English. It is certainly very misleading to name the period immediately succeeding the conquest *Semi-Saxon*, because it induces people to imagine that the so-called "Saxon," that is, the English, element of our language had begun to be mixed up with foreign ingredients, though, in point of fact, its two great monuments, *The Chronicle*, and Layamon's *Brut*, are all but absolutely free from such. It is proba-

ble, therefore, that the old divisions and their designations will before long be abandoned, and they are only retained here out of respect to a usage which has penetrated modern English literature.

As early as the 5th c., Teutonic invaders from the continent settled in this country, and drove the original Celtic-speaking inhabitants to the n. and w. of the island; so that before the battle of Hastings (1066), the tongue of the conquerors had been spoken in England for at least 600 years. The final absorption, after numerous conflicts, by the kings of Wessex, or West Saxons, of the various states of the "Heptarchy;" in the 9th c., went far to make the ruling speech of the land identical with that of Berkshire and Hants, the recognized center of the predominant sept. The use, besides, of this southern Anglo-Teuton speech as the chief instrument of literary communication, was permanently confirmed by the influence of king Alfred, a native of Berks. Further back than the time of this literary monarch, few existing remains of the language permit us to go; yet, from the writings of Cædmon, who was a North Anglian, and a few ecclesiastical MSS. of the kingdom of Northumbria, which extended from the Humber to the firth of Forth, it has been generally concluded that at least two dialects must have been used in the island—a northern and a southern one. The Anglian or northern dialect was, to some slight extent, marked by Scandinavian features; while the Saxon or southern dialect was more purely Low-Germanic, though the Anglian was also Low-German in all essentials. Some have accounted for the partial approximation of the Anglian dialect to Scandinavian by the fact that the Danes, at a later period, effected a settlement in the n.e. of England; but on the other hand, it is argued that "certain peculiarities of a Scandinavian character are to be found in the Anglian, even of a date anterior to the first Danish occupation of a part of England in the latter half of the 9th century." Nor would this be at all surprising if we admit that the Angles came from that corner of Slesvig still called "Angeln," or indeed from any region n. of the Elbe. Some philologers, again, insist on distributing the Anglo-Saxon language into more dialects than two; but it will be sufficient if the reader bear in mind the two which have been mentioned. It is important to notice here that neither the Anglian nor the Saxon borrowed almost anything from the language of the conquered Britons; in other words, English is very nearly free of any Celtic element. On the other hand, a considerable, but not large, number of Latin words found their way into the English vocabulary before the Norman conquest, through the introduction of Latin Christianity, and the translation of Latin authors into English.

The period in the history of our English tongue incorrectly described as *Semi-Saxon* because the inflections that marked the earlier stage then began to give way, dates from a generation after the conquest until near the middle of the 13th century. Like every transition era, it was a period of confusion, both to those using the language, and to those desirous of tracing its history. The monks of the time, accustomed to the use of mediæval Latin, had in a great measure forgotten the grammar of their native language; and when they attempted to write it, did so very badly. The *Chronicle*, which in its latest form comes down to 1154, and Layamon's *Brut*, written about 1190 or 1200, exhibit traces ot the breaking up of the grammar. The inflections and genders of the substantives, the definite and indefinite declensions of adjectives, are for the most part disregarded; a marked partiality is showed for weak preterits and participles; there is a constant substitution of *en* for *on* in the plurals of verbs; and the final *e* is often discarded; besides a great uncertainty prevailing in the government of prepositions. As regards the vocabulary itself, although employed in literature a century and a half after the Norman conquest, it exhibits, as already noticed, but few traces of Norman-French (only 90 words in 57,000 verses); proving beyond question that the immediate effects of that great change were by no means so important on the English tongue as they were at one time believed to be.

When we come to the *third* period in the history of English, commonly called *early English*, we have escaped most of the perplexities which attach themselves to the previous stage of our language. The tendency of the language to substitute an *analytical* for a *synthetical* structure is now seen vigorously at work. The "Anglo-Saxon" was tolerably rich in inflections, which are now largely got rid of. The various modifications of an idea are expressed by some relational word or words attached to the leading idea. During the second or semi-inflected period, the verbs suffered much less inflectional change than the substantives and adjectives; this will be found to hold throughout the entire 250 years of the era of reconstruction. In the fine poem of *The Owl and the Nightingale*, the Anglo-Saxon vowels *a*, *e*, *u*, in final syllables, are all represented by *e*, and the final *n* of the infinitive is beginning to disappear. In the chronicle of Robert of Gloucester we encounter, besides, a great number of French words (Dr. Marsh found 4 per cent in 10 pages), which had gradually become familiar to the people, through the presence of their Norman masters, and through the efforts of the latter to speak English after it was found impossible to supplant it by Norman French. The presence of French is, besides, very noticeable in the poetry of Chaucer and Gower; but there is no ground for the statement that these writers corrupted the language by a large admixture of novel French words. Dr. Morris is quite correct when he says (introduction to Chaucer's *Prologue*, etc., Clarendon press series), that Chaucer, "with few exceptions, employed only such terms as were in use in the *spoken* language, and stamped them

with the impress of his genius, so that they became current coin of the literary realm." And Mr. Skeat remarks (introduction to *Piers the Plowman*, same series), that "Langland does the very same thing, employing Norman-French words freely whenever he wishes to do so." As to Scotland, again, in the Anglian counties lying south of the Forth, and as far north of it as English had got a footing, the language also underwent such changes as we have noted in the more southern dialects. Barbour, a Scottish contemporary of Chaucer, wrote purer English than Chaucer did, only because he used less French. Regarding the north-eastern dialects of Scotland, indeed, some diversity of opinion exists. Some antiquaries are of opinion that the large infusion of Norse or Scandinavian elements in these dialects is to be accounted for by the fact of a Norwegian kingdom having been maintained there more or less from the 9th to the 11th c.; while others allege that the language of the n.e. of Scotland is in substance and grammar as decidedly Anglian as that of Norfolk or Yorkshire.

We may here notice the question which has often been asked: Which of the early dialects spoken in England is the origin of the form now used? We have seen that in the pre-Norman period *two* were employed for literary purposes, a northern or Anglian, and a southern or Saxon, the latter of which, through political causes, was perhaps considered the more classical of the two. In the period, however, succeeding the Norman conquest, and more especially after 1250, we find not *two*, but *three* dialects; a northern, a midland, and a southern. The cause of this was probably the breaking up of the supremacy of Wessex after the battle of Hastings. Circumstances now gave prominence to the midland counties, in which arose the great universities, the rich monasteries, and many other religious foundations. One of its subdivisions, the east midland, was the dialect in which Orm, Robert of Brunne, Wickliffe, Gower, and, above all, Chaucer wrote. It had then become the speech of the metropolis, and had probably forced its way south of the Thames into Kent and Surrey. This, therefore, may be considered the immediate parent of modern English, but inasmuch as the midland gathered into itself from its very position many of the peculiarities of the dialects spoken north and south of it, sir Frederick Madden's view (Layamon's *Brut*, 1851), that we must look for the real groundwork of modern English in a gradual coalescence of the various dialects, may still be considered substantially correct.

ENGLISH LITERATURE, like every other mental product, is qualified by the history of the nation to which it belongs. The great social eras of a country's history have always been found to correspond with the great intellectual eras of her growth. It will, however, be sufficient for our purpose to arrange the literary annals of England into three periods: 1. The period antecedent to the Norman conquest; 2. The period extending from the Norman conquest to the English reformation; and 3. The period extending from the English reformation to the present day.

1. *The Period antecedent to the Conquest.*—This period possesses a literature composed in three distinct languages—the *Celtic*, the *Latin*, and the *English*. Regarding the Celtic literature, see CELTIC NATION, IRISH LITERATURE, and WELSH LITERATURE. The introduction of Latin literature into this country was considerably later than the Roman invasion of it. The cultivation of the letters of Rome followed as a necessary consequence on the introduction of Christianity into the country. Towards the close of the 6th c., St. Augustine landed in the south of England, and laid the foundations of the Anglo-Catholic church. These great evangelists, however, rather prepared the way for literary effort on the part of others, than were themselves literary. The earliest names that we encounter are Gildas, Nennius, Bede, Alcuin, Asser, and Erigena. After the immigration of the Angles and Saxons into Britain, this people began to form a literature of their own. Their three historical poems—*The Gleeman's Song*, *The Battle of Finnesburgh*, and *The Tale of Beowulf* (q.v.)—are mainly versions of events which happened on the continent before the descent on the shores of England. Except the remarkable religious poems of the Northumbrian monk Cædmon, in the 7th c., little more of any moment in verse has been handed down to us by the English people who lived before the conquest. But this people, though comparatively poor in poetry, are eminently simple and straightforward prose writers. King Alfred discarded Latin in all his communications with his subjects, and in consequence the native language made an impressive start throughout the whole of England. From the *Chronicle*, which is made up from the MS. of several conventual records, modern scholars have derived special and valuable information. Portions of the sacred Scriptures were translated into English, several of the leading men of the time, such as Aldhelm, Bede, and Alfred, lending their assistance. Sermons and grammars, glossaries and medical treatises, geographies and dialogues between Solomon and Saturn, make up the file of this period of the literature.

2. *The Period extending from the Norman Conquest to the English Reformation.*—The conquest had the effect of changing the language of the court, the schools, and the tribunals of justice; it took but little effect on the native inhabitants. In a few centuries, owing partly to the obstinacy with which the English people clung to their mother-tongue, and partly to the circumstance that long settlement in England and political antagonism to France had practically changed the descendants of the Norman conquerors into English nobles, and inspired them with English feelings, the latter began to

abandon the use of French. "In 1349, boys ceased to learn their Latin through the medium of this tongue; and in 1362 (the 36th year of Edward III.), it was directed by act of parliament that all pleadings in the law-courts should henceforth be conducted in English, because, as is stated in the preamble to the act, French was become much unknown in the realm" (Morris's *Historical Outlines of English Accidence*, 1872). In a generation or two after the conquest, classical and theological learning made very considerable progress. Monasteries were busy, and the English universities were both by this time founded; while an interchange of teachers and pupils constantly went on between the English seminaries and those of France and other countries. Lanfranc and Anselm, Hales and Duns Scotus, Michael Scot and Roger Bacon, had attained to a great eminence in speculative and in physical philosophy. Doubtless their thinking was more characterized by its hair-splitting ingenuity than by its solidity, but the 12th and 13th centuries stand out in a distinguished manner in England, and indeed throughout Europe, for their peculiar devotion to speculative studies. But all these philosophers wrote in Latin, as did the historical writers of the same period, of whom the chief were William of Malmesbury, Geoffrey of Monmouth, Giraldus Cambrensis, and Matthew Paris. A literary feature of the age which must not be overlooked was the frequency of satire expressed in rhymed Latin verse. The most notable of the mediæval satirists was Walter Mapes, to whom is ascribed (though the evidence of his authorship is not conclusive) certain clever half-scurrilous poems, from one of which, the *Confessio Goliæ*, have been extracted a number of verses, commonly but erroneously spoken of as a "drinking-song" (see MAPES). The satire passed from the clergy, and was directed against the feeble king (John). De Montfort and the other great barons who distinguished themselves at Runnymede, are the theme of popular praise. In the same Latin tongue was composed the oldest legendary work of the middle ages. The *Gesta Romanorum* (q. v.) is a compilation of uncertain origin. The stories themselves are in many cases of great antiquity, and in their earliest forms can be traced to the distant east. In their Latin dress they were the property, not of England only, but of all western Christendom, and their only claim to notice in a special survey of E. L. arises from the fact that their editor, Elinandus, was perhaps an Englishman, and that they have furnished (at second or third hand) incidents and plots to the genius of Shakespeare and Scott. In the same relation to E. L. stands *The Seven Wise Masters*, traceable back to India, but known to all western Europe in a Latin form, and to England in particular under the title of the *Process of the Sevyn Sages*. The French Fabliaux affected our literature but little before the time of Chaucer. On the other hand, the romances of chivalry, rude and spirited, pathetic and imaginative, are well worth the attention of the student of English literature. The best of these, first written in French, but afterwards translated into English, celebrate the glory and fall of king Arthur and his knights of the Round Table, of which splendid use has recently been made by Alfred Tennyson in his *Idyls of the King*.

Meanwhile the English tongue was undergoing those serious grammatical and phonetic changes to which reference has already been made. During this half-chaotic stage it was scarcely fit to be a vehicle of literary expression, even if the ignorance and helplessness of the conquered people had not of themselves been sufficient to prevent the growth of a vernacular literature. The first indication of reviving life is the appearance of Layamon's *Brut* (see LAYAMON) about the close of the 12th century. The next century is comparatively rich in writers who use the English tongue, and whose works, if not masterpieces of artistic skill, are at least invaluable for linguistic purposes. The most important of these writers are Orm, Guildford, and Robert of Gloucester.

The period of what is called *Early English, embracing the 14th and 15th centuries*, is one of great importance, both in the progress of English history and of English literature. The translation (the first ever executed) of the Bible into English, which was completed by Wickliffe about 1380, is a work of great value, not only as a monument in the religious history of our nation, but in a philological point of view, being, as it is, all but first among the prose-writings in that form of the English tongue which is now in use. The principal book which precedes it, and the very oldest written in "early English," is sir John Mandeville's account of his eastern travels (1356). Somewhat later (between 1390 and 1400), Geoffrey Chaucer, the genuine father of English poetry, published his *Canterbury Tales*. A shrewd and sagacious observer, he has left behind him in these *Tales* a series of sportive and pathetic narratives, told with such a wonderful power of tenderness and humor, in such a simple, healthy style (although his vocabulary is largely modified by French, and is by no means a "well of English undefiled"), that they have been the wonder and delight of all succeeding times. Laurence Minot, Richard Rolle, Langland, author of *Piers the Plowman*, and Gower, fitly close round Chaucer as contemporaries who wrote more or less vigorous verse. About the same period flourished in Scotland John Barbour, whose epic narrative, *The Brus*, written about 1376, is incomparably the greatest of all the metrical chronicles. In the following century (the 15th), and in the early part of the 16th, occur in England the names of John Lydgate (1430), whose *London Lyckpeny* is still agreeable reading; Alexander Barclay, whose *Ship of Fools* was printed in 1509; John Skelton, author of the scurrilous satires of *Colin Clout* and *Why Come ye not to Court?* (died 1529); Howard, earl of Surrey (beheaded 1546–47), who wrote the first sonnets and the first blank verse in the English tongue; and sir Thomas Wyatt (died 1541). The prose writers of this period are sir John

Fortescue, chief-justice of the king's bench under Henry VI., who flourished 1430–70, and who wrote, among other things, a tract on the *Difference between an Absolute and Limited Monarchy, as it more particularly regards the English Constitution;* William Caxton, who introduced printing into Britain in 1477—the first book ever printed in this country being a translation of the French work *Le Recueil des Histoires de Troye;* sir Thomas Malory, whose *Morte Darthur* (1469–70) is the final form of the Arthurian romance; Hall, an English lawyer (died 1547), who wrote a chronicle of the *Wars of the Roses;* and Tyndale, burned (1536) for heresy. In Scotland, during the same period, we encounter in poetry the names of James I., king of Scotland (murdered 1437), author of the *King's Quhair*, etc.; Andrew Wyntoun, prior of Lochleven, whose *Oryginale Cronykil of Scotland* was completed about 1420; Blind Harry, author of *The Adventures of William Wallace*, a work written about 1460, and long exceedingly popular with the Scottish peasantry; Robert Henryson (died *circa* 1500), author of *The Testament of Cresseid*, etc.; William Dunbar (died about 1520), whose *Dance of the Seven Deadly Sins* shows him to have possessed great boldness and vigor in his delineations of character; and Gavin Douglas (died 1522), whose best work is a translation of Virgil's *Æneid* into English verse—at least into what both Scotchmen and Englishmen then reckoned English verse.

3. *The Period extending from the English Reformation to the Present Day.*—Among the brilliant works of the Elizabethan age, there is probably none of which we may not detect germs in some of the efforts which were made in the century that preceded. In theology, the names of Latimer (burned 1555), of Cranmer (burned 1556), and of Ridley (burned 1555), shine forth conspicuously; and it is sufficient to mention sir Thomas More (beheaded 1535), author of *Utopia*, a curious philosophical work, and Roger Ascham (died 1568), as excellent miscellaneous writers of that time. The last-mentioned, indeed, exercised no inconsiderable influence on the development of the English tongue, and his *Schoolmaster* is a work that is even yet influential. We may here mention the Scotchmen, Mair or Major, sir David Lyndsay, Boece, Melville, and, above all, George Buchanan, who is universally admitted to have been one of the finest classical scholars that ever appeared in Christendom.

The origin of the English drama is discussed in the articles DRAMA and MYSTERIES AND MIRACLE PLAYS. It is therefore only necessary here to note that the first English comedy, *Ralph Roister Doister*, was written by Nicholas Udall about 1552–53, and the first English tragedy, *Gorboduc*, or *Ferrex and Porrex*, by Sackville and Norton a few years later. The era on which we are next to look, the Elizabethan, is the most brilliant in the literary history of England. We may quote here the words of lord Jeffrey: "In point of real force and originality of genius, neither the age of Pericles, nor the age of Augustus, nor the times of Leo X. or of Louis XIV., can come at all into comparison. For in that short period we shall find the names of almost all the great men that this nation has ever produced; the names of Shakespeare, and Bacon, and Spenser, and Sidney; of Raleigh, and Hooker, and Taylor; of Napier, and Milton, and Cudworth, and Hobbes; and many others—men, all of them not merely of great talents and accomplishments, but of vast compass and reach of understanding, and of minds truly creative; not men who perfected art by the delicacy of their taste, or digested knowledge by the justness of their reasonings; but men who made vast and substantial additions to the materials upon which taste and reason must hereafter be employed, and who enlarged to an incredible and unparalleled extent both the stores and the resources of the human faculties." Even the minor dramatists of the time, such as Marlowe and Chapman, Beaumont and Fletcher, Jonson and Drummond, are all nearly the equals of any succeeding poets that have appeared. In the latter half of this period a new class of poetic writers started up, who were lyrical rather than dramatic, and whose occasional verses, sometimes descriptive, sometimes amatory, and sometimes religious, are characterized by a bright and delicate fancy, as if morning sunbeams glittered on their pages. These are George Wither, William Browne, Francis Quarles, and George Herbert, "the sweet psalmist of the 17th c." (as Emerson calls him). The last forty years of the 17th c. are generally known as the age of the restoration and the revolution. During this period, the literature of the stage was disgraced by its indecency. Charles II. and his court had brought back with them from France a love of polite profligacy, which found its most fitting expression in the comedy of intrigue. Four names stand out conspicuous as "sinners above all men in that generation"—Wycherly, Congreve, Vanbrugh, and Farquhar. Yet theology could boast of such names as Baxter, Owen, Calamy, Collier, Leighton, South, Tillotson, and Barrow. This was also the epoch when the great Milton, driven into the shades of obscurity by political adversities, fulfilled the uttered hope of his youth, and wrote "something which posterity will not willingly let die." About this time, too, Walton angled, and Butler burlesqued dissent; Marvell turned his keen irony against the high church; Locke and Newton speculated and discovered; and John Dryden, the literary chief of the time, "found the English language," according to Dr. Johnson, "of brick, and left it of marble."

The literary history of the 18th c., and of the reign of queen Anne, has been variously estimated. "If it was overvalued," says prof. Spalding, "by those who lived in it, and in the age that succeeded, it has assuredly been undervalued in our own day. It was long glorified as the Augustan age of English literature; but among ourselves it has been set aside as a skeptical, utilitarian age, when poetry could find no higher field

than didactic discussion, and prose found nothing to amuse but comic and domestic narrative, or bitter and stinging satire. The truth, as usual, lies in the middle. This age was far from being superior to every era that had gone before it, and it was not quite so low as some of its hostile critics have represented. One thing, however, is beyond dispute, viz., that the *form*, both in poetry and in prose, had come to be much more regarded than the *matter*. Addison, Swift, and Johnson may be taken as types of the prose writers of this century. The first, for ease and grace, is unmatched in any age; the second stands equally high for rough and pointed vigor; and the third is famous for his ponderous, finely balanced sentences, the dignity of which not unfrequently surpassed the sense. Defoe created no school, but the author of *Robinson Crusoe* will live for ever. The poetry of the time is represented by Pope, and it has been gravely asked whether he was a poet at all. He certainly versified with brilliant elegance, and the terror which his polished epigrams excited in the breasts of his enemies, showed him to possess a force of genius which at least demands our admiration. Young and Akenside were perhaps animated by a higher poetic sense, but they accomplished much less; and the same may also be said of Thomson, Gray, Collins, Beattie, and Cowper. Incomparably the greatest poet, however, of the 18th c. was Robert Burns, though he wrote in a dialect of English that has since become a *patois*, and even then, though used by a nation, was not the recognized standard of literary expression. Richardson, Fielding, Smollett, Sterne, Goldsmith, and Mackenzie are its novelists; Hume, Robertson, and Gibbon, its historians; Butler, Berkeley, Clarke, Shaftesbury, Hume, Paley, and Adam Smith its philosophers.

The 19th c., though full of interest for us, is, from the novelty and the variety of the intellectual character employed in it, one of the most difficult to analyze of the whole range of English literature. It has been a time of extraordinary activity; books have been multiplied to an unprecedented degree, and readers have increased in an equal proportion. It cannot be doubted, however, that the first quarter of this century is greater in *pure* literature than any subsequent portion of it. It is greater, besides, in poetry than in prose. The early names of Coleridge and Wordsworth, of Scott and Byron, of Shelley and Keats, of Campbell and Southey, are higher than any now prominent except that of Tennyson and perhaps Browning. The 19th c. is the age of novels and romances, of reviews and periodicals. Jeffrey and Sydney Smith, Hazlitt and John Foster, De Quincey and Carlyle, are the great names in review-literature: Hall, Chalmers, Irving, and Liddon in pulpit oratory; Stewart, Mackintosh, Bentham, Brown, Hamilton, Ferrier, Mill, Herbert Spencer, and Bain in philosophy; Dickens, Thackeray, Bulwer Lytton, Miss Bronte, and Miss Evans, as novelists; Hallam, Macaulay, Thirlwall, Grote, Milman, Carlyle, Froude, and Freeman, as historians; Ruskin, as a writer on art; Tennyson, the Brownings, Matthew and Edwin Arnold, Dobell, Smith, and Swinburne, as poets; and in the new world beyond the Atlantic, Washington Irving, Poe, Longfellow, Bryant, Cooper, Prescott, Emerson, Bancroft, Holmes, Hawthorne, and Bret Harte, with many more, rise before the mind when one tries to seize upon the great living authors of this age or those recently dead. A considerable portion of the literature of the 18th and 19th centuries is devoted to science, which can show a crowd of illustrious names too numerous to mention. Besides, in scientific works, the *matter* is of so much greater importance, and so much more attended to than the *form*, that it is not customary to include scientific writers in a survey of literature proper, though Tyndall and Huxley might well be named in any catalogue of English authors who write English with beauty and force.—See Chambers' *Cyclopædia of English Literature;* Taine's *English Literature*, translated by Van Laun.

ENGLISH PALE, or IRISH PALE, or THE PALE, a portion of Ireland brought under English rule before the complete subjugation of the whole island, corresponding nearly with the present province of Leinster, with the counties of Cork, Kerry, Waterford, Limerick, and Tipperary; but the boundaries varied at different times.

ENGRAFTING. See GRAFTING, *ante.*

ENGRAIL'ED, in heraldry, a line composed of a series of little half-moons, or semicircles, supposed to have been made in it by hail. E. is the opposite of invected.

ENGRAVING, in its widest sense, is the art of incising designs, writing, etc., on any hard substance, such as stone, metal, or wood. Many branches of the art are of great antiquity; such as gem-engraving, cameo-cutting, and die-sinking. The more important of these ornamental and useful kinds of E. are described under their proper heads. But in a narrower sense, E. is the special designation of the art of cutting or indenting the surface of metal plates or of blocks of wood with designs, for the purpose of taking off impressions or *prints* of the designs on paper. This department of the art arose as late as the 15th c., the earliest wood-engraving with a date being 1423, and the earliest dated E. from a metal plate being 1461.

Wood-engraving differs from E. on metal in this, that on a metal plate the traces or marks which are to appear on the paper are cut or sunk into the plate, and when printed from are filled with ink, while the rest of the surface is kept clean; whereas in wood-engraving they are left prominent or in relief, and the blank parts of the design are cut away. Hence a wood-cut acts as a *type*, and is inked and printed from in the usual way. See PRINTING. This makes wood-engraving peculiarly suitable for the illustration of

books; as the blocks can be printed from along with the letterpress; while the impressions from a metal plate must be taken by themselves, and by a slow process. The further treatment of the important art of wood-engraving is reserved for a separate article; our attention at present being confined to E. on metal.

It is beyond our scope to enter into the practical details of the various processes; we can only aim at enabling a reader altogether ignorant of them to conceive how the effects may be produced, and to understand the terms currently used in speaking of this kind of art.

The metals most commonly used for E. are copper and steel, the former having the advantage of being more easily worked, the latter of greater durability. The processes of working are essentially the same in both. The several manners or styles of E. are distinguished as line-engraving, mezzotinto, stippling, and aquatinta.

1. *Line-engraving*—in which, as the name implies, the effect is produced by a combination of lines—is executed either by direct incision with the graver or the dry-point, or by a combination of incision with *etching*—a chemical process to be immediately described. The *graver* or *burin* is usually in the form of a quadrangular prism, fitted into a short handle. In making the incision, the graver is pushed forward in the direction of the line required, being held by the handle, at an angle very slightly inclined to the plane of the copper. A *scraper* is required to scrape off the barb or burr which is formed by the action of the graver and dry-point. The *rubber* is a roll of cloth dipped in oil, and is used to make the surface smooth. A *burnisher* is required to polish the plate, and erases any scratches which it may accidentally receive, and also to make lighter any part of the work which may have been made too dark. The *dry-point* is like a sewing-needle fixed into a handle, and is used to cut or scratch the finer lines. The graver cuts the copper clean out, the dry-point throws it up on each side; and in some cases this is not scraped off, but made use of till it is worn off, as it gives richness to the line.

In etching, the first step is to cover the plate with a composition of wax, asphaltum, gum-mastic, resin, etc., dissolved by heat; an outline of the design, made on paper in pencil or red chalk, is then "transferred" to the surface of this composition, by being passed through a press. The subject is then drawn on the ground with the etching-point, which cuts through it, and exposes the copper. *Etching-points* or *needles* resemble large sewing-needles shortened, and fixed into handles 4 or 5 in. long; some are made oval, to produce broader lines. A rim of wax being put round the plate, acid is poured on, and corrodes the copper not protected by the ground. If the acid is found not to have acted sufficiently, it may be applied again to the whole design, or only to portions of it, by *stopping up*, with a mixture of lampblack and Venice turpentine applied with a camel-hair pencil, what been sufficiently *bitten in*.

When a series of parallel lines are wanted, as in backgrounds, etc., an ingenious machine called a ruler is employed, the accuracy of whose operation is exceedingly perfect. This is made to act on etching-ground by a point or diamond connected with the apparatus, and the tracings are bit in with aquafortis in the ordinary way.

2. The process of *mezzotinto* is by no means so difficult as line-engraving. The plate is prepared by being indented or hacked all over by an instrument with a serrated edge, called a cradle, which is rocked to and fro upon it in all directions. The barb or nap thus produced retains the printer's ink, and if printed, a uniform dark surface would be the result. On this plate, after a tracing has been transferred, the engraver goes to work with tools called scrapers and burnishers—those parts of the ground most smoothed being the highest lights, and the ground the least operated on producing the deepest shadows. As the work proceeds, it may be blackened with ink, applied with a printer's ball or otherwise, in order to ascertain the effect. The design is sometimes etched on the plate by the ordinary process, before the mezzotinto ground is laid.

3. *Aquatint Engraving.*—By this method, the effect of drawings in Indian ink is produced; and at one time it was greatly made use of in rendering the drawings of Paul Sandby and our early water-color painters, and particularly prints for drawing-books. In this process, which is a very complex kind of etching, the ground, which is composed of pulverized rosin and spirits of wine, assumes when dry a granulated form; and the aquafortis acting on the metal between the particles, reduces the surface to a state that an impression from it resembles a tint or wash of color on paper. David Allan engraved his celebrated illustrations of the *Gentle Shepherd* in this manner. It has now gone almost entirely out of use, having, like E. in imitations of drawings in chalk or pencil, been in a great degree superseded by lithography.

4. In E. in *stipple*, which was much in vogue in the end of the last century, the drawing and effect are produced by small dots, in place of lines. Ryland, Bartolozzi, and Sherwin, excelled in this style. It is well suited for portraits; several of Raeburn's have been capitally engraved in stipple by Walker. It involves much more labor than mezzotint, and is now little practiced.

Plate-printing.—Copper-plates, engraved in any of the above styles, are ready for press as soon as they are finished by the engraver. The method of printing from them is very simple. Their engraved surface is daubed over with a thick oleaginous ink, so that the lines are effectually filled. As this dirties the whole face of the plate, it is necessary to clean it, which is done by the workman wiping it first with a piece of cloth,

and then with the palms of his hands, rubbed on fine whiting. It may be calculated that a hundred times more ink is thus removed than actually remains in the identations; however, such is necessary. The plate being thoroughly cleaned, it is laid on a press, with a piece of damped paper over it; and being wound beneath a roller covered with blanket stuff, it is forced to yield an impression on the paper. The plate requires to be kept at a moderate warmth during the operation. The frequent rubbing of the plate with the hand to clean it, as may be supposed, tends greatly to wear it down; and such is the wear chiefly from this cause, that few copper-plates will yield more than a few thousands of impressions in good order. The earliest, called *proofs*, are always the best and most highly prized.

In consequence of this defect in copper, the practice of *engraving steel-plates*, for all subjects requiring a great many impressions, has now become very common. This process was introduced by the late Mr. Perkins of London, who originally softened the plates, engraved them, and then rehardened them—a practice now abandoned, as ordinary steel-plates can be worked upon by the burin, dry-point, scraper, and burnisher with perfect facility. Etching on steel-plates is executed much in the same way as in the process on copper. An E. on a steel-plate may be transferred in relief to a softened steel cylinder by pressure; and this cylinder, after being hardened, may again transfer the design by rolling it upon a fresh steel-plate; and thus the design may be multiplied at pleasure.

History of Engraving.—This most important invention, by which the productions of art are diffused without limit, is said to have been accidental, and is claimed for Tommaso Finiguerra, who first took impressions on paper about the year 1440. His employment was executing ornamental E., chiefly on articles used in religious services, such as small portable shrines, or altar-pieces. These were generally made of silver, and the designs engraved on them were filled up with a black composition, that hardened in a short time. This composition was called in Italian *niello* (from Lat. *nigellus*, dim. of *niger*, black), and the workers in it *niellatori*. It was the practice of Finiguerra, in the course of executing his work, to prove it by rubbing lampblack and oil into, and pressing paper over it; he thus obtained an impression of his work up to a particular stage, and was enabled safely to carry it on till it was completed. Finiguerra's title to the invention has been disputed; and in a recent work by J. D. Passavant, *Le Peintre-Graveur* (Leip. 1860), a strong case seems to be made out for its German origin. Be that as it may, the principal early Italian engravers who followed Finiguerra, were Bacio Baldini (born about 1436, died 1515); Sandro Botticelli (born 1437, died 1515)—he embellished an edition of Dante's *Inferno*, brought out in 1481; Antonio Pollajuoli (born 1426, died 1498, at Florence); Andrea Mantegna (born at Padua 1431, died at Mantua 1505); and Marc Antonio Raymondi (born at Bologna 1487 or 1488, died 1539), who executed his chief works at Rome. The most celebrated early German engravers were Martin Schoengauer (born at Colmar about 1455, died 1499); Israel van Mecheln, or Meckenen (born at Meckenen on the Meuse about 1450, and died 1523); Michel Wohlgemuth, who died in 1519; Albert Dürer (born at Nürnberg in 1471, died in 1528); and Lucas van Leyden (born at Leyden 1494, died 1533). The engravings of all these artists are very valuable, not only from their scarceness, and as illustrating the early history and progress of the art, but as exemplifying many high qualities that have never been surpassed in later times. The most of them were painters, and engraved their own works, except Marc Antonio, who engraved chiefly those of Raphael, by whom he was employed, and who occasionally overlooked and directed him. All those engravers, and their immediate followers, executed their works with the graver; but soon after, engravings came to be generally executed by two processes—etching, and cutting with the graver or the dry-point. The works of these early masters are often remarkable for character and expression, as those, for instance, by Mantegna; and for the correctness and high style of the drawing, for which qualities Marc Antonio has never been surpassed; also for finish of the most careful and elaborate kind, which has been carried further by Albert Dürer and Lucas van Leyden than by any other engravers. The styles of these early engravers were cultivated by numerous successors, several of whom followed their masters as closely as they could, while others diverged into something like originality: the chief names are Agostino Veneziano, about 1620; Nicolas Belin da Modena, and Giov. Ghisi, 1630; Luc. Damesz, who died in 1533; Giov. Giac. Caraglio, and Marco da Ravenna, about 1640; Giul. Bonasone, born at Bologna in 1498, died in Rome in 1564; Eneus Vicus, George Vens, Henrid Aldegraf, and Jean Sebast. Bœhm, about 1550; Adrian, Charles, William, and John Collert, Adam and George Ghisi, Sutermann, Virgilius Solis, Cornelius Cort, Martin Rota, and others, ranging from the middle to the end of the 16th century. Agost. Caracci, the celebrated painter, executed many spirited engravings. Saenredam, De Bruyn, Galle, Kellerthaller, Alberti, De Goudt, C. de Pass, Sadeler, are names of well-known engravers that enter on the 17th century. Henry Goltzius is noted for the number and variety of his works, and his imitations of the styles of the older masters. In the plates of engravers towards the middle of the 17th, and beginning of the 18th c., a large proportion of the work consists of etching, the graver being chiefly used for deepening and clearing up the etching. This arose from the manner of working being well adapted for rendering the style of the painters of that period, whose works were distinguished for freedom of execution or touch, and clear-

ness and transparency. The most noted engravers of this period were the Vischers, who flourished between 1610 and 1650, and engraved many of Berghem's pictures; Bolswert, 1620; Lucas Vosterman the elder, 1630; Suyderhoef, about 1640. These engravers rendered many of the works of Rubens in a very spirited manner. Coryn Boel—whose engravings from Teniers are in some respects superior even to La Bas—Troyen, and Van Kessel, are worthy contemporaries.

In the age of Louis XIV., a race of engravers of portraits arose, who carried execution with the graver almost to perfection. The works of the artists they engraved from were florid in style, with a great display of drapery and lace, and accessories in the backgrounds elaborately executed. Among these engravers the following rank highest: Gerard Edelinck (b. Antwerp 1627, d. Paris 1707)—he was one of the best engravers of the period, and specially patronized by Louis XIV.; Masson (b. 1636, d. 1700); Larmessin (b. 1640, d. 1684); Drevet the elder (b. 1664, d. 1739); Drevet the younger (b. 1697); Gerard Andran (b. 1640, d. 1703). There was a large family of Andrans engravers, but Gerard was the most celebrated, indeed, he was one of the best of the French engravers. Among engravers of talent in England may be mentioned Robert Walker (b. 1572); William Faithorne (b. London between 1620 and 1630, d. 1694) executed many excellent engravings of portraits; George Vertue (b. London 1684, d. 1756), a good engraver, and a man of general information and taste in matters of art; John Smith (b. London 1654, d. 1722) executed in mezzotinto a vast number of interesting portraits. In the 18th c., there were numerous excellent engravers, by whose works the taste for the pictures of the Dutch school of the 17th c. has been widely extended. Two of the most distinguished of these were John Philip le Bas (b. Paris 1708, d. 1782) and John George Wille (b. Königsberg 1717, d. 1808). Their styles are totally dissimilar. Le Bas's plates are chiefly etched, and remarkable for spirit and sharpness of touch and transparency; accordingly, mostly all his works are after painters who excelled in these qualities, particularly Teniers. Wille's engravings, again, are of the most careful and elaborate description, and his best prints are after Gerard Dow, Terburg, Mieris, and Metzu—masters distinguished for the high finish of their pictures. He worked with the graver; and his plates are distinguished by the precision and clearness with which the lines are cut.

It was about the middle and latter portion of last century that engraving reached its highest point in England. The works of William Hogarth (b. London 1698, d. 1764) are of world-wide celebrity, but that is owing mainly to the excellence and dramatic interest of the pictures from which the engravings are made, though, no doubt, his prints are engraved in a firm clear style, similar to that practiced by the French engravers of the time, several of whom were employed by him. It was sir Robert Strange (b. Orkney 1721, d. London 1792), an engraver of figures, and William Woolet (b. Maidstone 1735, d. London 1785), a landscape-engraver, who imparted to English E. those qualities and characteristics that enable us to claim a style of E. that is national, differing from other styles, and that has arisen and been best carried out in this country. In drawing and form, Strange was rather defective; but he excelled in what engravers call color, or the art of producing, by means of variety of line, a texture or quality that compensates for the want of color, by giving to the E. something of the richness produced by color in a picture. His imitation of the softness and semi-transparency of flesh was particularly successful, and superior to that of the French engravers, whose works, though in most respects admirable, failed in that respect, and had, in the more delicate parts, a hard or metallic look. Woolet treated landscape-engraving in a manner totally new, imparting to it more firmness and decision, by making great use of the graver. His works have more finish and force than former landscape-engravers, but they are in some degree liable to the objection of hardness, in the treatment of foliage in particular. The works of these two engravers have had a marked influence on art, not only in this country, but abroad. The merit of Strange's style was acknowledged on the continent; he was elected a member of the academies of Florence, Bologna, Parma, and Rome. At the end of last century, art had fallen very low on the continent, but a regeneration was beginning; and in Italy, engravers were then arising, such as Volpato and Cunego, who studied and imitated the softness and, technically speaking, fleshiness of texture that distinguished the works of the British engraver; those, again, were followed by Raphael Morghen, Longhi, Mercuri, and others, in Italy; by Boucher Desnoyers, Forster, etc., in France; and by Müller, Keller, Gruner, and numerous other engravers in Germany. By them, engraving has been carried to the highest pitch. Amongst their works, the following are *chefs-d'œuvres:* "The Last Supper," after Da Vinci, by R. Morghen; the "Sposalizia," after Raphael, by Longhi; "La Belle Jardinière," and other works, after Raphael, by Boucher Desnoyers, who has engraved the works of Raphael perhaps on the whole better than any other engraver. "The Madonna de San Sisto," by Müller, and "The Dispute on the Sacrament," after Raphael, of Keller. No engravings executed in this country come up to the works of these last-named masters, who have engraved works of a higher class than the majority of those done by Strange, while the drawing and general treatment of their works are in a purer and more correct style. However, the engravings of Burnet, Raimbach, Stewart, and others after Wilkie and contemporary British painters, deservedly held the highest place among works of the class to which they belong, and betoken clearly the great influ-

ence which Strange exercised on their style. At present, few figure-subjects are executed in the line-manner, and that art has certainly fallen in this country. This may be accounted for, perhaps, by the great use made of mechanical appliances, in portions of the work, to save time, and by the preference shown for mezzotinto-engraving as practiced at present, that is, with a mixture of lining or stippling. The greater number of Landseer's works have been engraved in that way, and it is now adopted for rendering the works of John Phillip and Millais, and the leading artists of the day. Several, however, of Landseer's earlier works have been engraved in the line-manner, particularly his pictures of "Drovers Leaving the Grampians," and "The Watering-place," by Watt, which are capital examples of line-engraving. There is no good modern school of landscape-engraving on the continent; the influence of Woolet was entirely confined to this country, where landscape-engraving, particularly in illustrated works after Turner, has attained great excellence.

Towards the end of last century, mezzotint engraving was practiced in England with great success; arising from its being peculiarly adapted to render effectively the works of sir Joshua Reynolds. M'Ardell, Earlom, Watson, Smith, Valentine Green, and Ward were among the best engravers of his works. The invention of this process is generally given to prince Rupert, others ascribe it to Dr. Wren, 1662, and state that prince Rupert merely improved on the invention. It has been practiced very generally from the time of its invention, but attained its highest position in sir Joshua's time; and it is very successfully carried out now, in an altered manner, additional force being aimed at, by means of stippling and etching. It is well calculated for producing broad effects: Turner's *Liber Studiorum*, and the landscapes after Constable, are admirable examples of its capabilities in this way; the effect in Turner's plates, however, is heightened by etching.

Etching has been already described as a part of the process of E.; but as practiced by painters, it is classed as a distinct art. The plate is prepared with a ground, and corroded in the same way; but the treatment is more free. Not being tied to the task of literally copying or translating the idea of another, like the engraver, the painter has scope to impart a spirit to his work peculiarly suggestive of what he intends to embody; his idea is represented directly, and not at second-hand, as it were. The etchings of Rembrandt, Paul Potter, Karl du Jardin, Adrian Vandevelde, Teniers, Ostade, Berghem, Backhuysen, Van Dyck, Claude, Salvator Rosa, Canaletti, and other painters, are very highly valued, as conveying more completely the feeling of the painter than the best engravings. Etching was more practiced by the old than by modern painters; yet Wilkie, Landseer, and other modern artists, have etched various plates, remarkable for character and spirit.

English works on E.—*Sculpture, or the History and Art of Chalcography and Engraving on Copper*, by John Evelyn (Lond. 12mo, 1663; 8vo, 1755); *The Art of Engraving and Etching, with the Way of Printing Copper-plates*, by M. Faithorne (Lond. 1702); *Sculptura Historico-technico, or the History and Art of Engraving, extracted from Baldinucci Florent, Le Compt, Faithorne, the Abecadario Pittorico, and other authors* (Lond. 4to, 1747, 1766, and 1770); *An Essay upon Prints*, by Gilpin (Lond. 8vo, 1767, 1768, and 1781); Strutt's *Biographical Dictionary of Engravers* (2 vols., 4to, Lond. 1785); Landseer's *Lectures on Engraving* (8vo, Lond. 1806); *An Inquiry into the Origin and Early History of Engraving upon Copper and on Wood*, by William Young Ottley (4to, Lond. 1816).

Of late years, many inventions have been introduced, having for their object to supersede the slow and laborious manual operations of E. by means of machinery and other appliances. It is, however, to business and ornamental purposes that they are chiefly applicable, and not to the production of artistic work of the kind treated of in this article. The subject will be noticed under MACHINE ENGRAVING, MEDALS, GLASS, etc. With regard to the reproduction of plates, and other applications of galvanic electricity to E., see GALVANISM and MAGNETO-ELECTRICITY. See also PHOTOGRAPHIC ENGRAVING.

ENGRAVING (*ante*). The 19th c. has produced most highly accomplished work in line engraving, both in figure and in landscape. Its characteristics, in comparison with the work of other centuries, are chiefly a more thorough and delicate rendering of local colors, light and shade, and texture. The older engravers could draw as correctly as the modern; but they either neglected these elements or admitted them sparingly, as opposed to the spirit of their art. If you look at a modern engraving from Landseer, you will see the blackness of a gentleman's boot (local color), the soft roughness of his coat (texture), and the exact value in light and dark of his face and costume against the cloudy sky. Nay, more, you will find every sparkle on bit, boot, and stirrup. Modern painting pays more attention to texture and *chiaroscuro* than classical painting did, so engraving has followed in the same directions; but there is a certain sameness in pure line engraving which is more favorable to some forms and textures than to others. This sameness of line engraving, and its costliness, have led to the adoption of mixed methods, which are extremely prevalent in modern commercial prints from popular artists. In the well-known prints from Rosa Bonheur, for example, by T. Landseer, H. T. Ryall, and C. G. Lewis, the tone of the sky is produced by machine-ruling, and so is much under tone in the landscape; the fur of the animals is all etched, and so are the fore-

ground plants, the real burin work being used sparingly where most favorable to texture. Even in the exquisite engravings after Turner, by Cooke, Goodall, Wallis, Miller, Wilmore, and others, who reached a degree of delicacy in light and shade far surpassing the work of the old masters, the engravers have recourse to etching, finishing with the burin and dry-point. Turner's name may be added to those of Raphael, Rubens, and Claude in the list of painters who have had a special influence upon engraving. The specialty of Turner's influence was in the direction of delicacy of tone. In this respect the Turner vignettes to Rogers' poems were a high-water mark of human attainment, not likely to be surpassed.

Pure line engraving is still practiced by a few artists in England and France. In France, the lovers of line engraving have endeavored to keep it alive by organizing themselves into a society for its encouragement. The most recent direction of the art, in the works of Ferdinand Gaillard, is a return to studied outline, but in combination with the most elaborate modeling. In his "St. Sebastian" the outline is studied and marked with careful firmness throughout, and the modeling is thoroughly worked out in minute touches and fine lines, giving powerful relief without any but the most delicate chiaroscuro.

To prepare a plate for etching, it is first covered with etching-ground, a composition which resists acid. A ground is to be of a quality so adhesive that it will not quit the copper when a small quantity is left isolated between the lines, yet not so adhesive that the etching point cannot easily and entirely remove it; at the same time a good ground will be hard enough to bear the hand upon it, or a sheet of paper, yet not so hard as to be brittle. The plate being grounded, its back and edges are protected from the acid by Japan varnish, which soon dries; then the drawing is traced upon it. The best way of tracing a drawing is to use sheet gelatine, which is employed as follows: The gelatine is laid upon the drawing, which its transparency allows you to see perfectly, and you trace the lines by scratching the smooth surface with a sharp point. You then fill these scratches with fine black-lead in powder, rubbing it in with the finger; turn the tracing with its face to the plate, and rub the back of it with a burnisher. The black-lead from the scratches adheres to the etching-ground, and shows upon it as pale gray, much more visible than anything else which you can use for tracing. Then comes the work of the etching-needle, which is merely a piece of steel sharpened more or less. Turner used a prong of an old steel fork, which did as well as anything; but neater etching-needles are sold by artists' color-makers. The needle removes the acid and lays the copper bare. Some artists sharpen their needles so as to present a cutting edge, which, when used sideways, scrapes away a broad line; and many etchers use needles of various degrees of sharpness to get thicker or thinner lines. It may be well to observe, in connection with this part of the subject, that while thick lines agree perfectly well with the nature of wood-cut, they are very apt to give an unpleasant heaviness to plate engraving of all kinds, whilst thin lines have generally a clear and agreeable appearance in plate engraving. Nevertheless, lines of moderate thickness are used effectively in etching when covered with fine shading, and very thick lines indeed were employed with good results by Turner when he intended to cover them with mezzotint and to print in brown ink, because their thickness was essential to prevent them from being overwhelmed by the mezzotint, and the brown ink made them print less heavily than the black. Etchers differ in opinion as to whether the needle ought to scratch the copper or simply to glide upon its surface. A gliding needle is much more free, and therefore communicates a greater appearance of freedom to the etching; but it has the inconvenience that the etching-ground may not always be entirely removed, and then the lines may be defective from insufficient biting. A scratch needle, on the other hand, is free from this serious inconvenience; but it must not scratch irregularly so as to engrave lines of various depth. The biting in former times was generally done with a mixture of nitrous acid and water, in equal proportions; but in the present day a Dutch mordant is much used, which is composed as follows: Hydrochloric aid, 100 grammes; chlorate of potash, 20 grammes; water, 880 grammes. To make it, heat the water, add the chlorate of potash, wait until it is entirely dissolved, then add the acid. The nitrous mordant acts rapidly, and causes ebullition; the Dutch mordant acts slowly, and causes no ebullition. The nitrous mordant widens the lines; the Dutch mordant bites in depth, and does not widen the lines to any perceptible degree. The time required for both depends upon temperature. A mordant bites slowly when cold, and more and more rapidly when heated. To obviate irregularity caused by difference of temperature, a good plan is to heat the Dutch mordant artificially to 95° F. by lamps under the bath, for which a photographer's porcelain tray is most convenient, and to keep it steadily to that temperature; the result may be counted upon; but whatever the temperature fixed upon, the result will be regular if the temperature be regular. To get different degrees of biting on the same plate, the lines which are to be pale are "stopped out" by being painted over with Japan varnish, or with etching-ground dissolved in oil of lavender, the darkest lines being reserved to the last, as they have to bite longest. When the acid has done its work properly, the lines are bitten in such various degrees of depth that they will print with the degree of blackness required; but if some parts of the subject require to be made paler, they can be lowered by rubbing them with charcoal and olive oil, and if they have to be made deeper, they can be re-bitten or cov-

ered with added shading. Re-biting is done with the roller above mentioned, which is now charged very lightly with paste, and rolled over the copper with no pressure but its own weight, so as to cover the smooth surface, but not to fill up any of the lines. The oil of lavender is then expelled as before by gently heating the plate, but it is not smoked. The lines which require re-biting may now be re-bitten, and the others preserved against the action of the acid by stopping out. These are a few of the most essential technical points in etching, but there are many matters of detail for which the reader is referred to the special works on the subject. During the last twenty years there has been a great revival of etching as an independent art. The comparative rapidity of the process, and the ease with which it imitates the manner of painters, have caused it to be now very generally preferred to line engraving by publishers for the transcription of all pictures except those belonging to a severe and classical style of art.

Aquatint may be effectively used in combination with line-etching, and still more harmoniously with soft-ground etching in which the line imitates that of the lead pencil. Of all kinds of engraving, mezzotint comes nearest to nature, though it is far from being the best as a means of artistic expression. Copper, steel, and zinc are the metals chiefly used in engraving. The use of copper is largely increased of late, as the copper is now coated with steel by electrotype process, which enables it to resist printing almost indefinitely, and the steel can be removed at pleasure. Zinc is similarly coated with copper, and is sometimes used for small editions. [Condensed from *Encyclopædia Britannica*, 9th ed.] See WOOD ENGRAVING.

ENGRAVINGS, PROPERTY OF. The property of engravings and prints is secured by statutes similar to those for the protection of literary property. By 8 Geo. II. c. 13, the property of historical and other prints was declared to be invested in the inventor for 14 years. The proprietor's name must be affixed to each print, and the statute imposes a penalty on print-sellers and others pirating the same. The provisions of this statute were extended by 7 Geo. III. c. 38, which secures to the widow of William Hogarth the sole right of printing and reprinting his works for the period of 20 years. The other acts are 17 Geo. III. c. 57, 6 and 7 Will. IV. c. 59—which extends the former acts to the whole United Kingdom—and 15 Vict. c. 12. The remedy was also simplified by 25 and 26 Vict. c. 68, enabling justices of the peace and the sheriff to act summarily in recovering penalties. The act 15 Vict. c. 12 was passed to explain the international copyright acts, and to explain the acts relating to copyright in engravings—reduces the duties on foreign engravings, and extends the protection of the acts to prints taken by lithography, or "any other mechanical process by which prints or impressions of drawings or designs are capable of being multiplied indefinitely"—a clause which has now been found to cover photographs.

ENGROSSING A DEED. See INGROSSING.

ENGROSSING AND REGRATING. An engrosser, regrater, or forestaller, is a person who buys grain, flesh, fish, or other articles of food, with the intention of selling them again at an enhanced price, either in the same fair or market, or in another in the neighborhood, or who purchases or contracts for corn while still in the field. These practices were regarded as criminal in most countries, before the laws by which trade is regulated were properly understood. In England, they were forbidden by various statutes, from the time of Edward VI. to that of queen Anne. These statutes were repealed by 12 Geo. III. c. 71, on the preamble, that it hath been found by experience, that the restraints laid upon the dealing in corn, meal, flour, cattle, and sundry other sorts of victuals, by preventing a free trade in the said commodities, have a tendency to discourage the growth, and to enhance the price of the same. It was found, however, that engrossing was not only a statutory but a common law offense, and a prosecution for it in the latter character actually took place in the present century. The act 7 and 8 Vict. c. 24, for abolishing the offenses of forestalling, regrating, and engrossing, was consequently passed. Besides declaring that the several offenses of badgering, engrossing, forestalling, and regrating be utterly taken away and abolished, and that no information or prosecution shall lie either at common law or by virtue of any statute, either in England, Scotland, or Ireland, this statute repeals a whole host of earlier enactments in restraint of trade, which had been omitted in the statute in the time of George III., above referred to. The rubrics of these enactments give a curious picture not only of the trading errors, but in many other respects of the obsolete customs of our ancestors. The first, for example (51 Henry III.), is called a "statute of the pillory and tumbrel, and of the assize of bread and ale." Then there is an act passed in several reigns which provides for the punishment of "a butcher or cook that buyeth flesh of Jews, and selleth the same to Christians."

Notwithstanding the doctrine of the Scottish law, that statutes may be repealed by mere desuetude, it was thought safer to include the Scottish statutes to the same effect. The earliest is 1503, c. 38, and the latest 1661, c. 280.

The statute 6 and 7 Vict. c. 24, does not apply to the spreading of false rumors, with the intent to enhance or decry the price of merchandise, or preventing goods from being brought to market by force or threats, which continue to be punishable as if that act had not been made.

ENG AND SHANG. See SIAMESE TWINS, *ante.*

ENGUE'RA, a t. of Spain, in the province of Valencia, 43 m. s.w. of the town of that name. It is poorly built, and has narrow and irregular streets. It has manufactures of linen and woolen goods, and some trade in cattle and agricultural produce. Pop. 5,250.

ENGUICHÉ. A hunting-horn, the rim around the mouth of which is of a different color from the horn itself, is said heraldically to be enguiché, of the color in question.

ENHARMONIC, a term applied in music when the name of a note is changed without any sensible difference of sound, such as C♯ and D♭, F♯ and G♭. Correctly speaking, there is, or ought to be, a difference; but on keyed instruments, such as the organ and pianoforte, there can be none, as the same key serves for both sharp and flat, while with a just equal temperament the ear is in no way offended. In harmony, the principal seat of enharmonic change is in the chord of the diminished seventh, which, by a change of the notes, may be treated fundamentally in four different ways, without any sensible difference in the intonation.

ENKHUI'SEN, a fortified t. and seaport of the Netherlands, in the province of North Holland, is situated on the western shore of the Zuider Zee, about 30 m. n.e. of Amsterdam. It is built with great regularity, and is of a circular form. The most important public building is an elegant town-house, with a lofty tower. There are two Dutch Reformed churches, to which five sixths of the people belong, the rest being Lutherans, Roman Catholics, Moravians, and Jews. The chief industries are ship and boat-building, rope-spinning, sail-making, refining salt, brewing, etc. There is a small trade in butter, cheese, corn, timber, cattle, and fish. Several vessels are engaged in the herring-fishing. Pop. '75, 5,560.

ENLISTMENT is the mode by which the English army is supplied with troops, as distinguished from the CONSCRIPTION prevailing in many other countries. Enlistment was in private hands until the year 1802, middlemen procuring recruits, and receiving a profit or commission for their trouble. This system being subject to much abuse, the matter was taken into the hands of the government in the above-named year, and is now managed by the adj.gen. Formerly, a soldier enlisted for life, and could never look forward to a period of freedom; or, at best, he could not retire on a pension while still possessed of a fair share of health and strength. This system was changed in 1847, by an act relating to *limited* enlistment; which provided that a man should enlist for 10 years for the infantry, or for 12 for the cavalry or artillery. At the expiration of this period, he could either quit the army, without pension; or re-enlist for the remainder of 21 years for the infantry, or 24 years for cavalry or artillery. This second period of service entitled the soldier to a pension for life, after his discharge: and, in 1868, twopence a day was added to the pay of every soldier who re-enlisted (or re-engaged). This system of enlistment provided soldiers: but did nothing for the growth of trained reserves, with which to bring the army to fighting strength in the event of war. The "army enlistment act," of 1870, seeks to remedy this defect, by allowing men to enlist for 12 years, with the understanding that 6 years or less shall be passed with the colors, and the remainder with the reserve. This is known as "short service;" and, under the system, from 1876 onward, a reserve of trained soldiers will be formed. It is estimated that with an army of 180,000 men, of whom three fourths are to serve only six years with the colors, there will accrue, by 1882, a reserve of 100,000 trained men, all under 32 years of age. If apprentices enlist, the master may recover them under certain conditions detailed in the mutiny act (q.v.) (which is passed every year). The mutiny act also provides that servants enlisting before the term of their engagement, are validly enlisted, and are entitled to wages up to the date of enlistment. Periods of imprisonment are not reckoned as part of the time of limited enlistment. A recruit enlists into either one of the 70 sub-district brigades, each of which comprises either a two-battalion regiment, or two single-battalion regiments, or he enlists for general service in any regiment to which the adj.gen. may post him; but artificers, as armorers, etc., are usually enlisted for general service, so that their services may be made available where most required. The army discipline and regulation act of 1879 made several important alterations in regard to enlistment. The recruit had always to appear before a magistrate, but formerly could not refuse to take the oath without paying a fine of 20*s*. Now he is not enlisted until he appear before the magistrate, who causes to be read to him a series of authorized questions, and satisfies himself that the man is not under the influence of liquor, and voluntarily agrees to enlist. The recruit then signs the declaration, takes the oath, and is attested by the magistrate. If the recruit does not so appear, or appearing does not assent, no further proceedings are taken. If within three months of his attestation a recruit pays a sum not exceeding £10, he is now entitled to be discharged.

ENLISTMENT, in the navy, is managed by the admiralty, and is changed from time to time in its details, according to the degree of willingness among sea-faring men to enter the service. In 1830, an act was passed to give certain additional advantages to volunteer seamen. In 1835, another act empowered the crown to double the amount of bounty given to a volunteer, if he was already a seaman. In 1847, it was enacted that

such persons as were entitled, if enlisted, to double bounty, should form a select class; and that ship-owners should not be allowed to hire such persons as crews for merchant-ships, if the government thought proper to issue a proclamation to that effect. At the commencement of the war with Russia, in 1854, it was deemed expedient not only to give extra bounties to seamen willing to enlist, but to make a money-present to seamen already in the navy, as an equivalent advantage. The bounty given to seamen varies from time to time, according to the exigencies of the service; but recent legislation has established a distinction between *limited* and *continuous* service. A seaman may enlist for 5 or for 10 years, or for the period the ship he enters is in commission; if for the longer period, he receives higher pay and other advantages. At the end of this longer period, he may demand his discharge; and, if abroad, he may claim to be brought home free of expense. His commanding-officer may, in emergency, retain his further service for 6 months, on payment of another increase of pay. The crown, besides, possesses a power of compelling renewed service from seamen under certain conditions, in case of invasion or other national peril.

Other matters bearing on this subject will be found noticed under BOUNTY, COAST VOLUNTEERS, IMPRESSMENT, and MANNING THE NAVY.

ENLISTMENT (*ante*), in the United States army, is superintended by the bureau of recruiting service, the chief officer of which is stationed in New York. There are quarters or branches in nearly all the large cities of the union, and two depots to which recruits are sent—fort Columbus, New York harbor, and the barracks at Newport, Ky. Men are enlisted for five years, and may be assigned to any branch of the service.

ENLISTMENT DURING THE REBELLION. The following is a list of the various "calls" for troops by the United States government during the war of the rebellion.

Date of Call.	Number of Men.	Term of Service.	Number obtained.
April 15, 1862	75,000	3 months	93,226
May to June 25, 1863	530,000	3 years	714,213
July 2, 1862	300,000	3 years	431,958
Aug. 4, 1862	300,000	9 months	87,000
Oct. 17, 1863	300,000	3 years	374,807
Feb. 1, 1864	200,000	3 years	
Mar. 14, 1864	200,000	3 years	284,021
July 18, 1864	500,000	1-2-3 years	384,882
Dec. 19, 1864	300,000	1-2-3 years	204,568

There were other calls for 30 and 100 days' men. The whole number called for was 2,759,049; total obtained 2,656,553. By act of congress Mar. 3, 1863, called the "conscription act," the president was authorized to draft troops. The act provided for an enrollment, a draft, the reception of substitutes, and arrest of deserters. About 3,000,000 men between the ages of 20 and 45 were enrolled. The calls from Oct. 17, 1863, were orders for drafts. But probably not more than 50,000 drafted men performed personal service. Substitutes were obtained. "The substitute fund" of the government, consisting of money paid in as a release from service, and which was used as a "bounty fund" for volunteers, amounted to $25,902,029.

ENMANCHÉ, or EMANCHÉ. See MANCHE.

ENNEAN'DRIA, the ninth class of plants in the Linnæan system, so called because the flowers have nine stamens. It is a small class, and the Linnæan classification being now generally superseded, the term is not often used.

ENNEMOSER, JOSEPH, known as a medico-philosophic writer, was b. 15th Nov., 1787, at Hintersee, in the Tyrol, and commenced his academic studies at Innsbruck in 1806. On the rising of the Tyrolese against the French in 1809, E. followed Andreas Hofer as his secretary, and honorably distinguished himself in battle on several occasions. At the close of the war, he went to Erlangen, and subsequently to Vienna, for the purpose of concluding his studies. Here, however, he experienced the greatest difficulty in procuring the means of subsistence, but fortunately fell in with a merchant from Altona, in whose company he traveled for some time. When Napoleon declared war against Russia in 1812, E. was despatched to England, to solicit aid for the Tyrolese in their meditated insurrection against the French domination. He was afterwards appointed by Friedrich Wilhelm III., king of Prussia, an officer in a regiment of volunteers, and soon gathered about him a company of Tyrolese marksmen, who were of great service during the campaigns of 1813 and 1814. After the peace of Paris, E. went to Berlin, where he finished his curriculum, and in 1816, took his degree of doctor of medicine. In 1819, he was made professor of medicine at the new university of Bonn, where he lectured on anthropology, physical therapeutics, and pathology. A love of his native country induced him to settle as a physician in Innsbruck, but in 1841 he went to Munich, where he obtained a great reputation by the application of magnetism as a curative power. Among his writings may be mentioned, *Der Magnetismus in seiner geschichtlichen Entwickelung* (Leip. 1819), which is reckoned his principal work:

Historisch-psychologische Untersuchungen Über den Ursprung und das Wesen der Menschlichen Seele (Bonn, 1824); *Anthropologische Ansichten zur bessern Kenntniss des Menschen* (Bonn, 1828); *Der Magnetismus im Verhältniss zur Natur und Religion* (Stuttg. 1842); *Der Geist des Menschen in der Natur* (Stuttg. 1849); *Was ist die Cholera* (2d edit., Stuttg. 1850); and *Anleitung zur Mesmer'schen Praxis* (Stuttg. 1852). He died in 1854.

EN NIS, a parliamentary and municipal borough, chief t. of co. Clare, Ireland, on the Fergus, 20 m. w.n.w. of Limerick, is a neat town, with some good houses. Pop. '71, 6,503, of whom 6,102 were Roman Catholics, and 401 of all other denominations. It returns one member to parliament. It has the ruins of a monastery founded in 1240 by O'Brien, prince of Thomond. Near the town is Ennis college, founded by Erasmus Smith. E. has a valuable limestone quarry, large flour-mills, and some trade in grain and cattle.

ENNISCOR THY, a market t. in the middle of Wexford co., Ireland, on a rising ground on the Slaney, 14 m. n.n.w. of Wexford. The Slaney is here tidal and navigable for barges, and flows through a fertile and beautiful valley. Pop. '71, 5,594, of whom 4,966 were Roman Catholics, and 628 of all other denominations. E. has a large corn-trade. It arose in a Norman castle, still entire, founded by Raymond le Gros, one of the early Anglo-Norman invaders. Cromwell took E. in 1649; and the Irish rebels stormed and burned it in 1798.

ENNISKIL LEN, a parliamentary and municipal borough, chief town of co. Fermanagh, Ireland, about 75 m. w.s.w. of Belfast, is beautifully situated on the Erne; the greater portion on an isle in the river between the upper and lower loughs Erne. It consists mainly of one undulating street running e. and west. Around, are richly cultivated eminences and many fine mansions. Its two forts command the only pass for 50 m. into Ulster across the Erne. The chief manufactures are cutlery and straw-plait. Pop. '71, 5,836, of whom 3,272 were Roman Catholics, 2,096 Episcopalians, and the rest of other denominations. It returns one member to parliament. E. is famous for the victory, in 1689, of the troops of William III., under lord Hamilton, over a superior force of James II., under lord Galmoy. The banners taken in the battle of the Boyne hang in the town-hall. The regiment of Enniskilleners, or 6th dragoons, was first instituted from the brave defenders of the town.

EN'NIUS, one of the earliest Roman poets, the father of the Roman Epos, was b. at Rudiæ, in Calabria, about 240 years before the Christian era, and was probably of Greek extraction. He is said to have served in the wars, and to have risen to the rank of a centurion. In Sardinia, he became acquainted with Cato the elder, and returned with him to Rome, when about the age of 38. Here he gained for himself the friendship of the most eminent men, among others that of Scipio Africanus the elder, and attained (what was then exceedingly rare in the case of an alien) to the rank of a Roman citizen. He supported himself in a decent but humble manner by instructing some young Romans of distinguished families in the Greek language and literature, his accurate knowledge of which explains the influence he had on the development of the Latin tongue. He died when he had attained the age of 70, or about 190 B.C. His remains were interred in the tomb of the Scipios, and his bust was placed among those of that great family. E. has tried his powers in almost every species of poetry, and although his language and versification are rough and unpolished, these defects are fully compensated by the energy of his expressions, and the fire of his poetry. His poems were highly esteemed by Cicero, Horace, and Virgil: the last, indeed, frequently introduces whole lines from the poety of E. into his own compositions. His memory seems to have been lovingly cherished by his countrymen; *Noster Ennius*, "Our Ennius," they used to call him. Of his tragedies, comedies, satires, and particularly of his *Annales*, an epos in 18 books, only fragments are still extant. What adds to our regret is, that it is believed his whole works were extant as late as the 13th c. (A. G. Cramer, *Hauschronick*). The fragments have been collected and edited by various scholars, among others by Hessel (Amst. 1707). The fragments of the *Annales* have been edited by Spangenberg (Leip. 1825). Compare Hoch, *De Ennianorum Annalium Fragmentis* (Bonn, 1839). The few fragments of his dramas that have come down to us were collected by Ribbeck in his *Scenicæ Romanorum Poesis Fragmenta* (2 vols. 1871–73).

ENNS, a river of Austria, rises at the northern base of a branch of the Noric Alps in the crownland of Salzburg, 12 m. s. of Radstadt. It first flows n. to Radstadt, then n.n.e. to Hieflau, after which it proceeds in a general direction n.n.w., passes Steyer, and joins the Danube 11 m. below the town of Linz, after a course of about 120 miles. Its chief affluents are the Salza and the Steyer. For the last 15 m. of its course, the E. forms the boundary between Upper Austria (Ober der Enns) and Lower Austria (Unter der Enns). The scenery on the banks of the E. is in general bold and romantic, as it flows, for the most part, between parallel mountain-chains, which are lofty and precipitous. In its lower course, it becomes navigable, but it is chiefly important from the valuable water-power which it supplies.

ENNS, or ENS, a t. in Austria, on the river Enns, near its junction with the Danube; pop. '69, 3,784. It has iron and steel manufactures. It stands on the site of a Roman station, Lauriacum, where in 304 Galerius inflicted a cruel persecution upon the Chris-

tians. The walls of the town were built with the ransom money paid for Richard I. of England.

ENOCH, the name of two different individuals in Scripture.—1. The eldest son of Cain, who built a city which was called after his name.—2. The son of Jared, and father of Methuselah. A peculiarly mysterious interest attaches to him on account of the supernatural manner in which his earthly career terminated. We are told by the writer of Genesis, that E. "walked with God 300 years . . . and he was not; for God took him." What the statement "he was not" signified to the later Jews, is explained by the writer of the Epistle to the Hebrews: "Enoch was translated that he should not see death." E. and Elijah are the only human beings on record who did not require to discharge the debt which mortals owe to nature. It may naturally be supposed that E. was a character on whom the extravagant fancy of the later Jews would fasten with unusual pleasure. As they came more and more into contact with Grecian and other culture, they felt the necessity of linking on the arts and sciences of Gentile nations to their own history, if they would continue to preserve that feeling of supremacy which was so dear to their pride as the chosen people. Hence, E. appears as the inventor of writing, arithmetic, astronomy, etc., and is affirmed to have filled 300 books with the revelations which he received, the number 300 being obviously suggested by the number of years during which he is said to have walked with God.

ENOCH, Book of. This book, from which, curiously enough, St. Jude quotes as if it were history, shows how richly mythical the history of the mysterious antediluvian E. had become! It was probably written originally in Aramaic, by a native of Palestine, in the 2d. c. B.C. The precise date is not known. At subsequent periods, it would seem to have been enlarged by additions and interpolations. It is divided into five parts; and the *first* discourses of such subjects as the fall of the angels, and the journey of E. through the earth and through Paradise in the company of an angel, by whom he is initiated into the secrets of nature, etc.; the *second* contains E.'s account of what was revealed to him concerning the heavenly or spiritual region; the *third* treats of astronomy and the phenomena of the seasons; the *fourth* represents E. beholding, in prophetic vision, the course of Divine Providence till the coming of the Messiah; and the *last* consists of exhortations based on what has preceded. The book was current in the primitive church, and was quoted by the fathers, but was lost sight of by Christian writers about the close of the 8th c., so that until last century it was only known by extracts. Fortunately, however, the traveler Bruce discovered in Abyssinia three complete MSS. of the work, which he brought to England in 1773. These MSS. proved to be an Ethiopic version made from the Greek one, in use among the fathers, as was evident from the coincidence of language. The Ethiopic version did not appear till 1838, when it was published by archbishop Lawrence. An English translation, however, by the same writer, had appeared in 1821, which passed through three editions, and formed the basis of the German edition of Hoffmann (Jena, 1833–1838). In 1840, Gfrörer published a Latin translation of the work; but by far the best edition is that of Dr. A. Dillmann, who, in 1851, published the Ethiopic text from five MSS.; and in 1853, a German translation, with an introduction and commentary, which has recently turned the attention of many German scholars to the subject.

ÉNOM'OTO KAMAJI'RO, one of the Japanese young men of promise sent by the tycoon in 1862 to study in Europe. In Holland, E. obtained a solid training in science and naval practice. Returning to Japan in 1867, he was put in command of the *Kaiyo Maru*, a 26-gun vessel of 400-horse power. The revolution breaking out, and the tycoon being overthrown, E. endeavored to obtain from the United States minister, gen. Van Valkenbergh, the possession of the *Stonewall*, formerly a confederate iron-clad ram built in England, captured by the United States forces, and purchased and paid for by the tycoon's government. Being unsuccessful, E. left the anchorage near Yedo, with the seven war vessels under his charge, and sailed to Hakodadi. Being disowned by his former master, E. declared himself and his forces independent, and set up a republic somewhat after the model of the United States, of which he was elected president. This government continued for several months, but by June, 1869, the land and naval forces of the mikado had reached Yezo, and battles rapidly followed each other at Esashi, Matsumae, and Kikonai. Finally, June 4, the final conflict took place at Hakodadi. The three vessels of E. were opposed to the five flying the mikado's flag, one of which was the iron-clad ram *Stonewall*. A terrific naval battle was kept up during several days, while the land forces were engaged almost continually. The "rebel" fleet and forts were utterly destroyed, chiefly by the iron-clad, and on the 26th, E. and the leaders surrendered. He was kept in prison until 1872, when he was pardoned and given a position in the Kai Takn Shi (department of colonization of Yezo). In 1874, he was made vice-admiral in the imperial navy, and sent to Russia as minister plenipotentiary, negotiating the treaty by which Russia gave to Japan the Kurile islands in exchange for the southern half of Saghalien. See KURODA.

ENOS (anciently, *Ænos*), an ancient t. and seaport of European Turkey, in the province of Adrianople, is situated on a rocky isthmus at the mouth of a gulf of the same name, about 35 m. w.n.w. of Gallipoli. It is the port of Adrianople, and has some trade in wool, camels' hair, cotton, leather, silk, etc. Its harbor is commodious, but so shal-

low, from being choked up with sand, that it admits only small vessels. Pop. 6,000, principally Greeks. The gulf of Enos is about 2¼ m. wide at the entrance, extends into the country for about 14 m., and is on an average 5 m. broad.

The town of E. is very ancient. Virgil mentions it (*Æn.* iii. 18) as being one of the towns founded by Æneas, after the sack of Troy; and Homer also attests its antiquity by alluding to it in his great poem (*Il.* iv. 519).

ENOS, ROGER, 1736–1808; an officer in Arnold's expedition to Quebec, but sent back with his troops for lack of provisions. He was afterwards an eminent citizen of Vermont.

ENRIQUEZ, GOMEZ ANTONIO (properly, ENRIQUEZ DE PAZ), a Spanish poet, the son of a baptised Portuguese Jew, was b. at Segovia early in the 17th century. He entered the army in his 20th year, and rose to the rank of capt.; but in 1636, had to flee the country, to escape the persecution of the Inquisition, which suspected him of a secret leaning to the creed of his father. E. settled at Amsterdam, and latterly professed the Jewish faith; in consequence of which, he was burned in effigy by the pious Catholics of Seville, 14th April, 1660. The date of his death is not known. During his residence in Spain, E. had considerable reputation as a dramatic poet. According to his own account, he wrote 22 comedies, which met with great success on the stage, in consequence of which, several of them passed as Calderon's. *La prudente Abigail; Engañar para reinar; Celos no ofenden al sol;* and *A lo que obligan los celos,* were published under the name of Fernando de Zárate. E's. comedies show him to have possessed much inventiveness, but in other respects they deserve little praise. Among his other writings are *Las Academias morales* (Rouen, 1642), containing some fine elegiac verse; *La Culpa del primer peregrino* (Rouen, 1644), a mystico-theologic poem; *El siglo Pitagórico* (Rouen, 1647), a series of satirical portraits partly in prose and partly in verse; and *El Samson Nazareno* (Rouen, 1656), an abortive epic. For a notice of E. and his writings, see Ticknor's *History of Spanish Literature.*

ENROLLMENT, entry upon a register or record.

Enrollment of Deeds.—In order to prevent the secret transfer of lands which was effected in England by means of a bargain and sale (q.v.), it was provided by 27 Hen. VIII. c. 16, that the deed must be enrolled; but a mode was soon adopted by lease and release of evading that act and attaining the same end. By the fines and recoveries act (3 and 4 Will. IV. c. 74), it is enacted that all transfers of land effected under the provisions of that statute, must be enrolled in the court of chancery within six months after the execution.

Enrollment of Decree in Chancery.—A decree in a suit in chancery did not receive full effect until it had been enrolled. And it used to be a practice to enroll a decree, and so prevent any appeal except to the house of lords. But enrollment after 1876 became useless; and it no longer prevents the usual appeal to the court of appeal in the first instance, and thence to the house of lords. The general rule under the judicature acts is that every decree may be appealed from within a year if final; and within 21 days if interlocutory. All appeals are now by way of re-hearing, and no petition case or other formal proceeding than notice of motion is necessary.

ENSCHEDÉ, a t. in the Netherlands, province of Overyssel, lies about 4 m. from the Hanoverian boundary, and 30 m. w.n.w. of Zutphen. Besides fustians and dimities, cottons for export to Java are largely manufactured. Cotton-spinning, bleaching, dyeing, and calendering also employ many of the inhabitants. There are several benevolent institutions, a Reformed, a Roman Catholic, a Baptist church, a chamber of trade, and grammar-school, in which French, English, and German are taught. In 1870, pop. 52,079.

ENSEMBLE (Fr.), the general effect produced by the whole figures or objects in a picture, the persons and plot of a drama, or the various parts of a musical performance.

ENSIGN was, until 1871, the title of the lowest combatant rank of commisioned officers in the British army, and is derived from their being charged with the duty of carrying the regimental colors or E. (Fr. *enseigne,* Lat. *insigne*). In the hand-to-hand mêlées of the middle ages, the preservation of the colors or standard, as the rallying-point of those fighting under the same leader, was a matter of vital importance, and was only intrusted to the bravest and most trustworthy. The colors were committed to him with imposing ceremony in presence of the assembled regiment, and he had to take an oath to defend them with life and limb, and if need were, to wrap himself in them as a shroud, and devote himself to death. The man who undertook this perilous post received sometimes as much as sixfold the usual pay. It was doubtless in this way that the point of honor arose respecting the colors. History records repeated instances where the oath was kept to the letter. In the modern system of warfare, the regimental colors are seldom exposed to such danger, and the office of E. is of less account. In the infantry, there were two kinds of subalterns below the capt., viz., the lieut. and the ensign. In the cavalry and artillery, the duties of E. were taken by officers who had the titles of cornet or second-lieut. When a gentleman entered the army, he began as an E. (if in the infantry), and from this rank he rose by purchase or seniority. The price of an E.'s commission is stated under COMMISSIONS,

ARMY, as well as the extra price to be paid on rising to the rank of lieut. The pay was 5*s.* 3*d.* per day, and the half-pay 1*s.* 10*d.* to 3*s.*; although it was most unusual for an E. to be on half-pay. An E. in the foot guards ranked as a lieut. in the army, and, on transferring his services to an infantry or cavalry regiment, exchanged with an officer of that grade.

The rank of E. having been abolished in the British army, the number of lieutenants has been proportionately increased; but for three years the officer only receives the same pay as the E. formerly had. The officer enters in the probationary grade of sub-lieut., which is converted to lieut. as soon as he proves himself qualified to command soldiers.

In the late East India company's army, a cadet became an E., in rank and pay, directly he landed in India.

ENSIGN is also the name of one of the flags belonging to the British fleet; and, under that or some other name, to most other fleets. It is a large flag or banner hoisted on an E. staff, a long pole erected over the poop, or at the gaff when the ship is under sail. Its chief purpose is to denote the nation to which the ship belongs. The English E. has for a groundwork one of three colors—red, white, or blue—and bears the union double cross of St. George and St. Andrew, or union-jack (q.v.), in the upper corner next the mast (dexter-chief). The *white* E. is also divided into four quarters by a red cross of St. George, and is limited to ships-of-war. Merchant-vessels are only allowed to carry the *blue* E.; but yachts, if of clubs acknowledged by the admiralty, colonial armed vessels, ships connected with government departments, and merchant-vessels commanded by officers of the naval reserve, are permitted to use the *red* ensign. Formerly, the English admirals required ships of all other nations to dip their ensigns to the English flag; the refusal of the Dutch to comply with this custom, was the signal for one of Blake's bloodiest encounters with Van Tromp.

ENSIGN (*ante*), in the U. S. navy, is the national flag. It is also used in the merchant service to designate the country to which the vessel belongs. There is an officer in the navy called ensign who ranks below master and above midshipman. In the army and the militia an ensign is assigned to each company, his duty being to carry the flag or standard of the company. Sometimes the duty falls to a sergeant.

ENSILAGE, green fodder, preserved for cattle, by a process not unlike that employed in the preparation of sauerkraut. A silo or pit, large or small, is first prepared; usually placed, for convenience of feeding, contiguously to the barn in which cattle are housed. It must be so constructed that the air can be excluded from its contents, and of such form and dimensions as will facilitate their settling into a solid mass, and as, when opened for feeding, will expose to the atmosphere as small a part of the surface as practicable. The construction of a silo 16 to 20 ft. long, 8 ft. wide, and from 15 to 20 ft. deep, is thus described: 12-in. perpendicular walls of hard brick, well laid in cement, with smooth joints. If the ground is sandy or gravelly, the outside of the walls next the earth is covered with a coat of cement, or the walls are filled in behind with clay or clayey earth, to prevent the passage of the air through them. The bottoms are also laid with brick upon the flat in cement. The walls are made so smooth upon their inner sides as to offer no obstacle to the settling and compacting of the food by friction of the sides. The pit may be made either open at the top and covered with a roof, or arched over under ground, with two necks coming up to within one foot of the surface of the ground, through which it is filled. The pit being prepared, the fodder is cut green, when in the best condition, or in bloom, passed immediately through the cutting-machine, to reduce it to uniform short lengths of not more than 1 in., and then deposited and trodden firmly into the pit, sufficient salt being used to render it palatable, but no more. As fermentation—which will commence at once—proceeds, and the mass settles, the cutting and treading in of fresh fodder must be continued from day to day, after an interval of about 36 hours, until the pit is filled and settling has ceased. Then the pit is immediately and thoroughly sealed over the whole top surface of the fodder, by a well-compacted layer of clean fodder, not less than 6 in. thick, excluding the air. Over this layer, some lay planks weighted with heavy stones; others deem this needless. The fodder to be thus treated may be corn, red clover, pearl millet, West India millet, or Guinea corn, green rye, oats, mixed grasses, or any other succulent production of which cattle are fond. Food preserved by this process is greatly relished. It is eaten eagerly and clean, leaf and stalk, without any loss whatever; and stock thus fed exhibit the highest conditions of health and thrift. It is recommended especially for milch cows, as it increases the quantity and improves the quality of milk.

ENSINAL', or ENCINAL, a co. in s.w. Texas, drained by affluents of the river Neuces; 1610 sq.m.; pop. '70, 427. It is a cattle-raising region, and contained, in 1870, 1678 cattle, 5,778 sheep, and produced 9,556 lbs. of wool.

ENTABLATURE, that part of a design in classic architecture which surmounts the columns (q.v.), and rests upon the capitals. It is usually about two diameters of the column in height, and is divided in every style of classical architecture into three parts—architrave, frieze, and cornice. These parts vary in their relative proportions in different styles. In Doric architecture, for example, if the E. be divided into eight equal parts, two of these form the height of the architrave, three that of the frieze, and three

that of the cornice. In the other styles, the relative proportions are as three, three, and four.

The term E. was not used till the 17th c., the members composing it being previously simply designated the cornice, frieze, and architrave.

1. *The architrave* is the horizontal portion which rests immediately upon the abacus of the column. It is usually ornamented with horizontal moldings, with flat spaces or *faciæ* between. The upper molding always projects further than the others, so as to throw off the rain. This molding varies in different styles. In Doric, it is a plain square projection, with small pendants or *guttæ* under the triglyphs. In the other styles, it is generally an ogee or talon molding. These moldings are frequently enriched with leaf ornaments, and in very florid designs the faciæ are also enriched.

2. *The frieze* is the middle portion of the E., between the top of the architrave and the bed of the cornice. In the Doric style, it is ornamented with triglyphs or slight projections, divided by angular grooves into three parts. The spaces between the triglyphs (called metopes) are square, and are either plain or enriched, either with figure-sculpture, as in the Parthenon, or with bulls' heads, pateræ, or other ornaments. In the other styles, the frieze is never cut into portions, but is either left quite plain or ornamented with figure-sculpture or scroll-work. The former is most usual in Greek art, the latter in Roman. In late Roman works, the frieze is sometimes *swelled* or made to project with a curve.

3. *The Cornice* forms the upper portion of the entablature. It is divided into several parts. The lower molding or moldings resting on the frieze are called the bed-moldings —the upper projecting part is called the corona (q.v.), and between the two there are frequently introduced modillions and dentil bands. The bed-molding is generally of an oval or echinus form, and is frequently enriched with the egg and tongue or leaf ornaments. The upper molding of the corona is generally of a *cymarecta* form (see COLUMN, fig. 1), and is often ornamented with lions' heads. These represent the openings through which the rain was at first led off from the roof-gutters, which were cut in the top of this molding, and were retained as ornaments after their original use was discontinued. The corona projects well over the frieze and architrave, and protects them from rain, while at the same time, by its broad shadow, it gives repose and variety of effect to the building. The *soffit*, or under side of the corona, is frequently paneled and ornamented with pateræ.

Origin.—The component parts of the E. are said, with some appearance of truth, to owe their origin to the forms of the construction of the oldest temples. These were of wood, and were put together in the manner most natural for that material. The square beams laid across from post to post are represented by the architrave; the triglyphs of the frieze are copied from the ends of the cross-beams; the cornice is taken from the boarding which covered the rafters and ties of the roof—projected so as to throw off the rain; and the dentils and modillions show the ends of the rafters left uncovered.

Whatever the origin of the E. may have been, it is a remarkable fact, as connected with Greek and Roman art, how persistent the E. was as a feature in the decoration of these classic styles. So long as buildings consisted of one story in height, this was quite natural; but after this simple system was abandoned, and when, as in Roman architecture, series of columns and entablatures were piled one above the other—not used constructionally, but simply applied to the face of the building—the cornice, frieze, and architrave still retained their places and proportions. In the revived Roman art of the 16th c., the E. was used in a manner still further removed from its original purpose. The strict proportions of the various parts were entirely lost sight of. The frieze was increased in height, so as to admit of small windows to light the entresol or mezzanine (q.v.), and in the French and English forms of the renaissance, the various members become still more attenuated and altered from the original design (see RENAISSANCE). But in no modification of classic architecture, however debased, is the E. awanting. The architrave, frieze, and cornice are essential portions of every classic design.

ENTADA, a genus of climbing shrubs of the natural order *leguminosæ*, sub-order *mimoseæ*, having pinnate or bipinnate leaves, and remarkable for their great pods, in which the seeds lie amidst a glutinous or gelatinous substance. The seeds of *E. pursætha*, an East Indian species, are saponaceous, and are used for washing the hair. The plant attains a great size; its pods are sometimes fully 5 ft. long, and 6 in. broad; the seeds are beautiful brown beans, so large that in Ceylon they are often hollowed out and used as tinder-boxes.

ENTAIL, or, as it is frequently called in Scotland, *tailzie*, from Fr. *tailler*, to cut, properly signifies any destination by which the legal course of succession is cut off, one or more of the heirs-at-law being excluded or postponed, and the settlement of land made upon a particular heir or series of heirs. The desire to preserve in our own family land which we have either inherited or acquired, appears to be inherent in the human mind. The first distinct trace of the existence of entails, is to be found in the Roman law. The Greeks, indeed, permitted persons to name successors to their estates, and to appoint a substitute who should take the estate on the failure of him first named. The substitute, as appointed, was permitted to succeed on the death of the institute (as he was called) without leaving issue or without alienating the estate. But this limited

right fell far short of the power of entailing which has since prevailed in various countries. At Rome, under the later emperors, the practice of settling land upon a series of heirs, by means of *fideicommissa* (q.v.), grew up, and was sanctioned by the state. These deeds, which were originally simply a trust reposed in the honor of a friend, to whom the property was conveyed, to carry out the will of the grantor, by degrees received the sanction of the law. In their early form they contained merely a substitution of heirs. Thus, "*Rogo ne testamentum faciat, donec liberos susceperit.*" "*Rogo ut testamento suo Seium hæredem faciat.*" "*Rogo hæredem, ne hæreditatem alienet, sed relinquat familiæ.*"—Heineccius, s. 658. But by the later law, a much fuller form of settlement was admitted, whereby the estate was protected from every sort of alienation. "*Volo meas ædes non vendi ab hæredibus meis, neque fœnerari super eas: sed manere eas firmas, simplices, filiis meis et nepotibus in universum tempus. Si aliquis autem eorum voluerit vendere partem suam, vel fœnerari super eam, potestatem habeat vendere coheredi suo et fœnerari ab eo: si autem aliquis præter hæc fecerit, erit quod obligatur, inutile atque irritum.*"—*Dig.* xxxi. 88, s. 15. Here we have an example of the principal clauses of a strict E. as subsequently more fully carried out in Scotland. It is impossible to doubt that this Roman form must have been adopted by the Scottish lawyers in framing their deeds of entail. The limitation to a particular line of descent, the prohibition to alienate or burden with debt, and the still more peculiar feature of the declaration of forfeiture in case of non-compliance, are to be found in both forms. There are, however, two points in which the Roman law differed from that which prevailed for many years in Scotland—viz., that the former did not recognize the right of primogeniture, and that the limitation of the deed was restricted to four generations. For the right of primogeniture, as recognized in deeds of E., we are indebted to the feudal law. That system, which has united with the civil law to form a basis for the codes of modern Europe, did not, in its original form, recognize the right of a holder of land to alienate his feudal benefice. But the right of the eldest son to represent his father, both in the duties and privileges of the fief, if not an original principle of the system, was universally recognized in the days of its greatest power. We shall presently see how this principle was embodied in a Scottish deed of entail. We come now to consider entails as they have existed in modern nations.

In England, the Saxons, it is said, prohibited the alienation of lands by those who had succeeded to them under condition that they should not alienate.—Wilkins's *Leges Saxonicæ*, p 43 (note). Among the Saxons, the law of primogeniture was not recognized. But on the establishment of the feudal laws in England, a practice began to prevail whereby an estate was settled upon a particular series of heirs, as "to a man and the heirs of his body." This is the first germ of an entail in England. It was called a fee-simple conditional, because the judges refused to recognize an absolute limitation of the estate to a particular line of heirs, but held the destination to be conditional on the birth of an heir, and that that condition having been purified, the donee was free to alienate the estate. The common law thus refusing to recognize entails, a statute was passed which had the effect of introducing that practice into England. This was the famous statute *De Donis* (q.v.), whereby it was declared that the estate should be held *secundum formam doni*. In order to the creation of an entail under this statute, it was not enough that the estate was limited to "a man and his heirs," as those words were held to constitute an estate in fee; it was necessary that the estate should be given to "a man and the heirs of his body," or "to a man and the heirs of his body by his wife Joan." The former was called a general, the latter a special entail. Another form whereby lands might be entailed under the statute *De Donis*, was by settlement in Frank-marriage (q.v.). For nearly 200 years after the passing of this act, lands settled in the form which it prescribed continued to be held under the fetters of a strict entail. But the tendency of the law, which in Scotland, as we shall presently see, was to strengthen the power of entails, was, in England, in the opposite direction. For a long time, tenants in tail, taking advantage of legal technicalities, were able practically to defeat the limitation in tail by means of a discontinuance. But it was not till the time of Edward IV. that an effectual means of evading the provisions of the act was brought into use; this was achieved by means of a process called a common recovery. See FINES AND RECOVERIES. By this process, a tenant in tail could bar the E., and convert the estate into a fee-simple. Another mode of barring an E. was by means of a fine (q.v.). It had been declared by the statute *De Donis*, that levying a fine of lands should be no bar to the E.; but by 32 Hen. VIII. c. 36, it was enacted that a fine of lands, when duly levied, should be a complete bar to the tenant in tail, and those claiming under him. It is to be observed that the operation of a fine was confined to those claiming under the tenant in tail: those who had rights of reversion or remainder under the grantor of the E. were not excluded by this species of assurance; so that by means of a recovery only could an estate tail be converted into a fee-simple. From the introduction of common recoveries till the passing of the fines and recoveries act (3 and 4 Will. IV. c. 74), a period of more than 300 years, it was impossible that an estate could be held under the fetters of an E., if the tenant in tail and the next heir chose to combine to defeat the entail. By the fines and recoveries act, the technicalities formerly necessary in order to bar an E. were removed, and tenant in tail may now, by a simple conveyance, alienate his estate at pleasure. An estate tail is a freehold of a limited

description. Tenant in tail may commit waste (q.v.). Formerly, an estate tail was not liable to the debts of the tenant, but by 1 and 2 Vict. c. 110, this restriction has been removed. Copyhold lands have been held not to fall under the operation of the statute *De Donis*. A limitation, therefore, which in a freehold creates an estate tail, in copyhold lands creates a fee-simple conditional, according to the old common law, except where the custom of the manor is to the contrary.

In Scotland, as in England, entails appear first to have taken their rise from the feudal usages. It has been observed by lord Kames, that while the feudal system was in its vigor, every estate was in fact entailed, because no proprietor had any power to alter the order of the succession. But when the stricter feudal principles gave way, and the power of alienating land began to be recognized, the holders of estates sought to secure, by deed, in their own families the lands which they possessed. The form first adopted for this purpose was the simple destination, whereby the estate was simply limited to a particular series of heirs, without prohibition to alienate, or declaration of forfeiture for contravention of the will of the grantor. In this form, the deed must have resembled the early English entails. The feudal law of primogeniture having been received as a principle of common law, the estate would naturally descend from father to son in the line indicated by the deed. But, as it was held that those succeeding under this deed were not restrained from alienating, the practice of adding prohibitory clauses was introduced. Entails in this form were held to bind the heir from granting gratuitious alienations; but he was not restrained from selling the estate, or burdening it with debt. Early in the 17th c., a further addition was made to the form of the deed by the introduction of irritant and resolutive clauses, i.e., clauses declaring the act of alienation to be null, and to infer the forfeiture of the estate. The form thus adopted, which resembles closely the form of the Roman deed already noticed, was fortified by a decision of the court of session in the Stormont E., M. 13,994, holding that an estate so protected could not be attached by creditors. This decision created much difference of opinion amongst lawyers as to the power of the grantor thus to protect an estate from the onerous act of the heir, in consequence of which the famous Scotch E. act, 1685, c. 22, was passed, by which it was enacted that an estate conveyed by a deed fortified by prohibitory, irritant, and resolutive clauses, and recorded in a particular register, should be effectually secured in the line of destination. This act has always been most strictly viewed by Scottish lawyers; and entails which have been found deficient in any of the prescribed requisites, have been regarded by the courts as utterly ineffectual. The first lord Meadowbank, in a judgment which has always been regarded as a leading authority, laid it down that entails "are the mere creatures of statute," and that where the interests of third parties are concerned, every part of an E. is liable to the strictest interpretation (*Hamilton* v. *Macdowall*, 3d Mar., 1815). The operation of the old E. act was found, notwithstanding, to be of the most oppressive character. Statutes were in consequence passed from time to time, empowering heirs of E. to exercise larger powers of ownership than could be granted under the act 1685, and to make provisions for their families. At length, by 11 and 12 Vict. c. 36, and 38 and 39 Vict. c. 61, the power of fettering lands by a strict E. has been finally destroyed. By this act, heirs under an existing E. may disentail, with the consent of certain heirs next in succession; and in all entails made after 1st Aug., 1848, and also in old entails where the heir in possession was born since 1st Aug., 1848, the heir of E. in possession may, by means of a simple deed of disentail, free his estate from the restrictions of the entail.

In America, before the rebellion, the English law as to estates tail prevailed. But in the United States the law of entails has been gradually abandoned by the several states; and property can now be fettered, to a limited extent only, by means of executory devices (q.v.). In France, the power of creating entails has varied much at different periods, from the right to make a perpetual E., which appears to have been the original principle, to a limitation to four, and at one time to two degrees. But by the code Napoleon, ss. 896–897, entails are now absolutely prohibited. In Spain, also, entails, which were permitted under certain restrictions, have been entirely abolished by a law of the cortes in 1820. Thus it will be seen that the right of securing land in a particular family, which commends itself to the natural feelings, has been found so oppressive in operation, and so injurious to the public interest, that after an existence of more than 600 years it has been practically discarded almost simultaneously by the general consent of modern nations.

ENTAIL, or **ENTAYLE** (Fr. *tailler*, to cut), often used by old English authors for any architectural ornament which is sculptured or cut in stone. Chaucer speaks of

"An image of an other entaile;"

and other examples are given by Parker (*Glossary of Architecture*).

ENTASIS (Gr.), the swelling outline given to the shaft of a column (q.v.).

ENTELLUS MONKEY, or HONUMAN (*semnopithecus entellus*), an East Indian species of monkey, with yellowish fur, face of violet tinge, surrounded with projecting hairs, long limbs, and very long muscular and powerful—though not prehensile—tail. It is held in superstitious reverence by the Hindus, and is often to be seen exhibiting much impudent familiarity in the precincts of temples; indeed, temples are often specially

dedicated to it; hospitals are erected for its reception when sick or wounded. Hindu laws affix a far more severe punishment to the slaughter of one of these sacred monkeys than of a man; the peasant esteems it an honor when his garden is plundered or his house robbed by troops of them, and would consider it an act of the greatest sacrilege to drive them away. They take their places with perfect confidence on the roofs of houses, and gaze at the passing crowd. This is one of the very few species of monkeys found in the northern provinces of India, and in summer ascends the Himalaya to the pine-forests, and almost to the snow-line; it has even succeeded in crossing the mountains, and occurs in Bhotan.

ENTERI'TIS (Gr. *enteron*, the intestines), inflammation of the bowels, and especially of their muscular and serous coat, leading to constipation (q.v.) and pain, with colic (q.v.), and sometimes ileus (q.v.). E. is distinguished from these last affections, indeed, only by the presence of inflammatory symptoms—i.e., pain, tenderness, fever, etc., from a very early stage of the disease, and in so decided a form as to require special attention. If E. does not depend upon mechanical obstruction, it may be combated by hot fomentations, with moderate leeching and counter-irritation, and the internal administration of opium. Injections of warm water, or of asafœtida and turpentine (see CLYSTER), should be at the same time given to clear the lower bowel; and all purgatives, except in some cases castor oil, should be avoided. The disease is, however, one of great danger, and should never be incautiously treated with domestic remedies. It is closely allied to peritonitis (q.v.), and often depends upon internal mechanical causes, or on external injury.

In the Lower Animals.—Inflammation of the bowels, among the heavier breeds of horses, generally results from some error of diet, such as a long fast, followed by a large, hastily-devoured meal, indigestible or easily fermentible food, or large draughts of water at improper times. When thus produced, it is frequently preceded by stomach staggers or colic, affects chiefly the mucous coat of the large intestines, and often runs its course in from eight to twelve hours. With increasing fever and restlessness, the pulse soon rises to 70 or upwards, and, unlike what obtains in colic, continues throughout considerably above the natural standard of 40 beats per minute. The pain is great, but the animal, instead of recklessly throwing himself about, as in colic, gets up and lies down cautiously. Respiration is quickened, the bowels torpid. Cold sweats, stupor, and occasionally delirium, precede death. When connected with, or occurring as a sequel to influenza, laminitis, and other complaints, the small intestines are as much affected as the large, and the peritoneal as well as the mucous coat of the bowels. This form is more common in the lighter breeds. When the patient is seen early, whilst the pulse is still clear and distinct, and not above 60, and the legs and ears warm, blood-letting is useful, as it relieves the overloaded vessels, and prevents that exudation of blood which speedily becomes poured out in the interior of the bowels. This disease should be treated as follows: In a pint of oil, or an infusion of two drams of aloes in hot water, give a scruple of calomel and an ounce of laudanum, and repeat the calomel and laudanum every hour in gruel until the bowels are opened, or five or six doses are given. Encourage the action of the bowels by using every half-hour soap and water clysters, to which add laudanum so long as pain and straining continue. If the animal is nauseated and stupid, with a cold skin, weak quick pulse, bleeding and reducing remedies are very injurious; and the only hope lies in following up one dose of the calomel and aloes with small doses of laudanum and sweet spirit of niter, or other stimulants, repeated every forty minutes. In all stages, woolen cloths wrung out of hot water and applied to the belly encourage the action of the bowels, and relieve the pain.

E. in cattle is mostly produced by coarse wet pasture, acrid or poisonous plants, bad water, and overdriving. The symptoms are fever and thirst, a quick but rather weak pulse, restless twitching up of the hind limbs, tenderness of the belly, and torpidity of the bowels. Calves generally die in three or four days, other cattle in a week or nine days. Bleed early, open the bowels with a pint of oil and a dram of calomel, which may be repeated in eight or ten hours, if no effect is produced. Give every hour fifteen drops of Fleming's tincture of aconite in water, until six or seven doses are given. Allow only sloppy and laxative food, such as treacle, gruel, or a thin bran mash; employ clysters and hot cloths to the belly, and use two ounce doses of laudanum if the pain is great. E. in sheep mostly occurs in cold exposed localities, and where flocks are subjected to great privations or improper feeding. The symptoms and treatment resemble those of cattle.

ENTERPRISE, the seat of justice of Volusia co., Fla., on St. John's river and lake Monroe; 205 m. from Jacksonville, at the head of steam-boat navigation. It is a popular winter resort for northern visitors; has sulphur springs, and good hotels.

ENTOMOLOGY (Gr. *entomon*, an insect, *logos*, a discourse), the science which has insects (q.v.) for its subject. The mere collector of insects may be one of the humblest laborers in the great field of natural history, but his labors contribute materials for the more philosophic naturalist who studies the structures of these creatures, and compares them with one another according to the unity and the variety of design which they exhibit. And when we begin to take into account the vast number of different species of insects, their great diversities of structure and of habits, their great complexity of organization,

the wonderful transformations which many of them undergo at different stages of their existence, and the equally wonderful but extremely various instincts which many of them display, we find E. to be a science worthy to engage the noblest mind. But besides all these things, we must remember that insects serve most important purposes in the general economy of nature; and that some of them are directly useful to man, some directly injurious, at least when their numbers are at any time excessively multiplied.

E., along with the other branches of natural history, was cultivated by Aristotle and other Greeks. Aristotle is the most ancient author of whose works anything relating to this science now remains. Pliny has little on this subject but what is copied from Aristotle; and it can scarcely be said to have been again studied as a science till the 16th c., when attention began once more to be directed to it, although it was not till the 17th c. that much progress was made, or that any important works on E. appeared. Insects then began to be described, not only those of Europe, but also some of the curious and splendid insects of tropical countries; bees and other insects of particular interest received attention; the metamorphoses of insects began to be studied, and their anatomy to be investigated. The names of Goedart, Malpighi, Swammerdam, Leuewenhoek, and Ray deserve to be particularly mentioned; but the infant state of the science may be illustrated by the fact, that about the end of the 17th c., Ray estimated the whole number of insects in the world at 10,000 species, a number smaller than is now known to exist in Britain alone. In the 18th c., the name of Linnæus occupies as high a place in the history of E. as in that of kindred branches of science. The progress of the science was much promoted by his arrangement and exhibition of the discoveries of previous and contemporary naturalists; and by his system of classification, founded on characters taken from the wings, or their absence, a system professedly artificial, yet so harmonizing with the most natural distribution into groups, that some of its orders were indicated by Aristotle, and that it has retained and seems likely to retain its place, modified, indeed, but not essentially changed. De Geer and Fabricius are perhaps, after Linnæus, the most worthy to be named of the great entomologists of the 18th century. At the close of the 18th and beginning of the 19th c., the name of Latreille is pre-eminently conspicuous; and in the year 1815, a new impulse began to be given to the study of E. in Britain by the publication of the admirable *Introduction to Entomology* of Messrs. Kirby and Spence, a work combining in a remarkable degree the merits of being at once popular and scientific. Since the beginning of the 19th c., the number of insects known and described has prodigiously increased; many entomologists have with great advantage devoted themselves particularly to the study of particular orders of insects; and many valuable monographs have appeared. Entomological literature has now become very extensive. The progress of the science has owed not a little to entomological societies, of which the entomological society of London may be particularly mentioned. We cannot attempt to enumerate the distinguished entomologists of the 19th c., but perhaps the names of Leach, Macleay, Curtis, Stephens, Westwood, Smith, Walker, Stainton, Swainson, and Newman, deserve particular notice among those of Britain; Meigen, Jurine, Gyllenhal, Gravenhorst, Hubner, Dufour, Boisduval, Erichsen, and Lacordaire among those of the continent of Europe; and Say among those of America. It is to be regretted that we have not yet any complete work on the insects of Britain. The *Insecta Britannica*, of which some volumes by different authors have been published under the auspices of the entomological society, is intended to supply the want.

ENTOMOL'OGY. See INSECTS, *ante*.

ENTOMOS'TRACA (Gr. insect-shells), a term introduced by Müller, and adopted by Latreille, Cuvier, and other naturalists, to designate the second of their two great divisions of crustaceans (q.v.). The number of species of E. is very great. They are all of small size, except the king-crabs (*limulus*), which in many respects differ from all the rest, and have recently been formed by some naturalists into a sub-class of crustaceans by themselves. Many of them are minute, and exist in great numbers both in fresh and salt water, particularly in stagnant or nearly stagnant fresh water, affording to many kinds of fishes their principal food. They differ very much in general form; the number of organs of locomotion is also very various—in some very few, in some more than 100—usually adapted for swimming only, and attached to the abdominal as well as to the thoracic segments; but there never is a fin-like expansion of the tail, as in some of the malacostracous crustaceans. The antennæ of some are, however, used as organs of locomotion. Some of the E. have mouths fitted for mastication, and some for suction. Not a few are parasitic. The heart has the form of a long vessel. One or two nervous knots or globules supply the place of a brain. The organs of respiration are in certain species attached to some of the organs of locomotion, in the form of hairs, often grouped into beards, combs, or tufts, or blade-like expansions of the anterior legs are subservient to the purpose of respiration: in others, no special organs of respiration are known to exist. The eyes are sometimes confluent, so as to form a single mass—one eye—in the front of the head. The name E. has been given to these creatures in consequence of most of the species having shells of one or two pieces, rather horny than calcareous, and of very slender consistence, generally almost membranous and transparent. In

very many, the shell consists of two valves, capable of being completely closed, but which, at the pleasure of the little animal, can also be opened so as to permit the antennæ and feet to be stretched out.

The study of the smaller crustaceans has recently been prosecuted with great assiduity and success, by Milne-Edwards and others; and in consequence of the great differences existing among them, new classifications have been proposed, and the name E. has by some been restricted to those which have a mouth formed for mastication, but no special organs of respiration, forming a section which is subdivided into two orders, *ostracoda* and *copepoda*, the former having a bivalve shell or shield, the latter destitute of it.—But the name E. is still commonly employed in its former wider sense.

ENTOMOSTRACA, Fossil. E. attained their maximum size in the palæozoic waters, which they tenanted in vast shoals. The Silurian trilobite (q.v.) was a phyllopod, and the pteregotus of the old red sandstone was nearly allied to the modern limulus. Small bivalvular species are found in all strata, sometimes, as at Burdie-house, near Edinburgh, forming layers of considerable thickness, at others scattered in enormous numbers in the dried sediments of lakes, as in the fresh-water clays of the Wealden, or forming in some places a large proportion of chalk, with the multitudes of their thin calcareous coverings.

ENTOPHYTES (*Entophyta;* Gr. *enton*, within, and *phyton*, a plant), a term usually employed to denote those parasitic plants which grow on living animals. It is seldom extended to vegetable parasites which grow on living vegetables, whether on external or internal parts, nor is it restricted to those which are found in the internal cavities, or within the substance of animal bodies, but includes all which have their seat on living animal tissues. It does not, like the analogous term *entozoa*, denote any particular class of organized beings; some of the E. are *algæ*, and some *fungi*, but to these two orders they are limited, and all of them belong to the lower sections of these orders; some of them to those lowest sections in which the distinguishing characters of the two orders cannot easily be traced, so that they are referred to the one or the other on very slender grounds; those in which a coloring matter is present being reckoned algæ, although it can be observed only in masses of aggregated cells, and not in the cells when viewed separately, and those which even in the mass appear entirely colorless, being considered fungi. Many of the algæ and fungi parasitic on plants are nearly allied to those which occur on animals; thus, ergot and the kind of mildew which has proved so destructive to vines, are referred to the same genus (*oidium*) to which is also referred the fungus found in the diseased mucous membrane in cases of *aphthæ* or *thrush:* and another genus (*botrytis*, q.v.) contains the fungus called muscardine, or silkworm rot, so destructive to silkworms, together with the fungus which accompanies or causes the potato disease, and many other species which infest plants. Common mold is even supposed to occur on animal tissues tending to decay, during life, as well as on dead animal and vegetable substances.

Vegetable parasites occur both in man and in the lower animals; not a few of them are peculiar to fishes, and more are peculiar to insects than to any other class of animals. The fungi which grow on the bodies of insects sometimes attain an extraordinary development: *sphæria Sinensis*, which grows on a Chinese caterpillar, and to which medicinal virtues, probably imaginary, are ascribed in China, attains a length greater than that of the caterpillar itself. A similar species (*S. Robertsii*) is found on the caterpillar of a New Zealand moth.

The situations in which E. occur are very various. Some, like the thrush fungus already noticed, appear in diseased conditions of the mucous membrane; some find their place in the lungs, the ear, or other organs; some on the skin, in the hair follicles, and *in* as well as *on* the hair itself. The "fur" which appears on the tongue when the stomach is disordered, abounds in the extremely slender unbranching threads of the alga called *leptothrix buccalis*, which also vegetates luxuriantly in cavities and corners of the teeth not sufficiently visited by the tooth-brush. The lungs of birds, the gills of fishes, the intestines of insects, the wing-covers of beetles, the eggs of mollusks, all have their peculiar vegetable parasites by which they are sometimes infested.

It is often by no means easy to say whether the presence of E. is to be regarded as the consequence or as the cause of disease; sometimes it may be both. Sometimes it appears to be certainly a consequence, as when the *sarcina* (or *merismopæ*) *diaventriculi* occurs in the contents of the stomach and bowels; sometimes, as in the diseases called *favus, porrigo, tinea, herpes tonsurans, plica polonica, mentagra, pityriasis versicolor*, etc., it seems entitled to be regarded as the cause of the diseased state, and the cure of the disease seems to be accomplished by killing the parasite, often a thing of no little difficulty.

Whence the germs of E. are derived is often a question to which it would not be easy to find an answer. Their spores are extremely minute; but there are no plants which produce seeds or spores more abundantly than some of them do; the growth of the plants themselves is very rapid, and reproduction is "very intense and rapid."

It has sometimes been imagined that epidemic diseases may be caused by spores of E. conveyed through the air; no evidence has, however, been produced to render this

opinion probable. An attempt was made to establish the existence of cholera fungi or algæ, but it completely failed.

ENTOZO'A. This term is applied to all the animal forms which live either in the natural cavities (as, for example, the intestinal canal), or in the solid tissues (as, for example, the liver) of other animals. The number of these parasites is so great (there being at least 20 distinct species of worms found in man, 14 in the dog, 15 in the horse, 11 in the common fowl, etc.), and their occurrence so frequent, especially in some of the lower animals, that we must regard their presence, at all events in many species, rather as the normal condition, than as a morbid state due to accidental causes.

It is worthy of notice, that many of the animals included amongst the E. only enjoy a parasitic existence during a part of their total life, which often, as in the well-known case of perfect insects, presents very varied and distinct phases. Thus, for example, the larvæ of the gadfly (*œstrus equi*) undergo their entire development in the stomach of the horse, attaching themselves by minute hooks to the gastric mucous membrane; they then detach themselves, pass along the intestines, and in due time are discharged, and undergo their further changes externally; and many similar instances might be quoted. For this reason, and additionally because parasites are now known to belong to various classes of animals, we no longer attempt, like Linnæus and Cuvier, to form a special group of E.; and a reference to the *vermes intestinæ* in the *systema naturæ*, or to the *entozoaires* in the *règne animal*, at once shows that these illustrious naturalists grouped together animals with few or no true natural affinities.

Although most E. belong to the class of *vermes*, or *worms*, this, as has been already observed, is by no means exclusively the case. Thus, even fishes may lead a parasitic existence; a fish of the genus *fierasfer* being frequently found in the respiratory cavity of the *holothuria tubulosa*, or *sea-cucumber*, and small fishes having been frequently observed in the cavity of the *asteria discoïdes*. Amongst the crustaceans, instances of parasitism are by no means rare; different species of *lernæa* being abundant in the branchial (or gill) cavity, and on the surface of numerous fishes, while the *linguatulæ* infest mammals, reptiles, and fishes, being found in the olfactory sinuses, the larynx, the lungs, the peritoneal cavity, etc. The instances in which mollusks are found to live parasitically are few; certain gasteropods, however, inhabit the bodies of echinoderms, holothurias, and comatulas; and amongst the lamellibranchiates, species of modiolaria and mytilus live in the bodies of ascidians. There are several cases of polyps which have been observed to adopt a parasitic existence; and finally, various protozoa are not unfrequently met with in the animal fluids; for example, certain species of *vibrio*, *cercomonas*, and *paramecium*, have been found in the intestinal evacuations in cholera and diarrhea; *monads* have been found in the urine in cholera, and certain infusoria and rhizopoda in the blood of the dog, the frog, and many other animals. See HÆMATOZOA.

The more common kinds of E. appear to have attracted the notice of the earliest physicians and naturalists whose opinions or works have reached us. Hippocrates speaks of several worms, especially the tæniæ and ascarides, infesting the human intestinal canal; and Pythagoras learned in India that the bark of the pomegranate acted almost as a specific in cases of tape-worm. Aristotle noticed both the tape-worm of the dog and of man, and the *cysticercus cellulosæ* (see CESTOID WORMS) of the pig; but utterly unconscious that the cysticercus, under favorable conditions, became developed into a tape-worm (see TAPE-WORM), referred the origin of all intestinal worms to spontaneous generation—a doctrine that seems to have been generally adopted till the 17th c., when Redi published (in 1684) a work on helminthology, in which he distinctly showed that the generation of various E. followed the same laws as in higher animals, and that in many instances there were distinct males and females. The great recent discovery, that the vesicular or bladder-like parasites, such as the different species of cysticercus and cœnurus, are cestoid worms in an early stage of development, is alluded to in CESTOID WORMS, and will be more fully noticed in the article TAPE-WORM.

Another point of general interest in connection with E. is the part of the body in which they are found. While most live in the intestinal canal and other open cavities (as the larynx, bronchial tubes, etc.), others are found in the closed cavities and in the parenchymatous tissue of the liver and other solid organs. Thus (confining our remarks to the E. occurring in man), *anchylostoma duodenale*, *strongylus duodenalis*, *two species of ascaris*, *oxyuris vermicularis*, *trichocephalus dispar*, *distoma heterophyes*, at least four species of *tænia*, and *bothriocephalus latus*, have been found in different parts of the intestinal canal; while *strongylus gigas* inhabits the kidney, another species of *strongylus* the lungs, a species of *spiroptera* the bladder, two species of *filaria* and *monostoma lentis* the eye, *trichina spiralis* the voluntary muscles, two species of *echinococcus* and *cysticercus cellulosæ*, various parenchymatous tissues, two species of *distoma* the gall-bladder, another species the portal vein, and the *filaria medinensis*, or *guinea worm*, the subcutaneous tissue.

Davaine, who may be regarded as one of the highest living authorities on this subject, gives the following synopsis of the E. occurring in man and the domestic animals (see his *Traité des Entozoaires*, Paris, 1860).

TYPE I. PROTOZOA, including the genera *bacterium, vibrio, monas, cercomonas, trichomonas, paramecium.*

TYPE II. CESTOIDEA, including the families of *tæniadæ* and *bothriocephalidæ.* The *tæniadæ* occur (1) in their undeveloped, cystic, or vesicular form, constituting the genera *cœnurus* and *cysticercus;* and (2) in their perfect, ribbon-like shape, constituting the genus *tænia,* of which about 20 species have been described. The *bothriocephalidæ* contain the single genus *bothriocephalus,* which embraces various species. Their early or vesicular stage has not yet been described.

TYPE III. TREMATODEA, including two well-marked secondary types: (1) The *polystomidæ,* which live as epizoa on the skin or gills of aquatic animals, and which do not concern us here; and (2) the *distomidæ,* including the genera *monostoma, distoma, holostomaa, amphitoma,* with the doubtful genera of *tetrastoma* and *hexathrydium.*

TYPE IV. ACANTHOCEPHALA, with the single genus *echinorhynchus.*

TYPE V. NEMATOIDEA. Passing over two cases in which these worms have been discovered, apparently in their larval or imperfectly developed state (once by Rainey in the human trachea, and once by Vulpian in the kidney of the dog), Davaine gives the following genera, *oxyuris, ascaris, spiroptera, trichina, trichosoma, trichocephalus, filaria, dochmius, sclerostoma, strongylus, anchylostoma, dactylius.*

TYPE VI. ACANTHOTHECA, including the genus *pentastoma.*

Alarming as the above list may seem, comparatively few of the worms contained in it do in reality give rise to dangerous or severe symptoms. It seems to be a condition of parasitism, that the animal upon which the parasite lives must not be destroyed by it; and it has been suggested by one of our highest authorities on this subject, Van Beneden, that in many cases the parasite does not so much attack the organism in which it exists, as its superabundant products. Dujardin and other helminthologists have described cases in which worms were developed by thousands in persons apparently in good health. The symptoms occasioned by ascarides, tæniæ, etc., are described in the articles ASCARIS, TAPE-WORM, etc.

The multiplication of worms is most rapid in debilitated persons, especially children living in cold and damp situations; and impure water, unripe fruits, and raw or imperfectly cooked meat, have considerable influence on the development of these animals. For the description of the medicines used for their destruction, see the article VERMIFUGES; and for information regarding the structure and habits of the most important E., see the articles ASCARIS, BOTHRIOCEPHALUS, CESTOID WORMS, GUINEA-WORM, MONOSTOMA, NEMATOIDEA, STRONGYLUS, TAPE-WORM, THREAD-WORMS, TREMATODA, TRICHINA SPIRALIS, TRICHOCEPHALUS.

ENTR'ACT, in music, is an instrumental piece, composed in the form of a little symphony or overture, to be performed between the acts of a play.

ENTRÉ DOURO E MINHO, or, as it is frequently called, MINHO, a province of Portugal, in the extreme n.w. of the country, is bounded on the n. by Galicia, from which it is separated by the river Minho; on the e. by Galicia and Trasos Montes; on the s. by the province of Beira, from which it is separated by the river Douro; and on the w. by the Atlantic ocean. It has an area of about 2,810 sq.m., and a pop. (1874) of 1,018,690. It has been called the paradise of Portugal, and indeed it may be doubted whether any territory in Europe of equal extent exhibits so much beauty. It is traversed from n.e. to s.w. by three mountain-ranges, which, however, sink down as they approach the coast, leaving a considerable tract of undulating country along the sea-margin. The chief rivers, besides those already mentioned as forming the northern and southern boundaries of the province, are the Lima—a portion of the vale of which is said to form the loveliest landscape in the world—the Cavado, and the Tamego. The climate is agreeable and healthy. The chief productions are wine, oil, flax, maize, wheat, barley, oats, and vegetables. Wine, which is shipped at Oporto, is largely exported. Along the coast are numerous fisheries, at which great numbers find employment. The province of Minho consists of three districts, Braga, Vianna, and Porto.

ENTREMETS, ENTRÉES, French terms now used in England to designate certain courses of dishes served at fashionable dinners. The chief dishes are *entrées,* and the lighter dishes are *entremets.*

ENTRE RI'OS (the Spanish for *between rivers*) takes its name from its occupying the space between the Parana and the Uruguay. It is one of the states of the Argentine confederation. The area is estimated at from 30,000 to 40,000 sq.m., and the population, in 1869, at 134,271 inhabitants. The country is almost entirely pastoral—its principal productions being hides, horns, tallow, and jerked beef. The soil is not well fitted for cultivation, for, besides being rather swampy throughout, it is subject, in the south, to annual floods. The capital is Concepcion del Uruguay, with a pop. of 6,500.

ENTRESOL is a low story between two main stories of a building (generally between the ground floor and the first story), or between two portions of one story, when certain rooms are of greater height than the others upon the same floor. The rooms in the E. are called *entresols* or *mezzanines.*

ENTRO'PIUM, or ENTROPION (Gr. *en,* in, and *trepō,* I turn), inversion of the eyelashes, or even eyelid, consequent either on loss of substance, or on inflammatory

swelling of the lid. If confined to one or two eyelashes, they should be plucked out by the roots, and the bulbs should be cauterized; but the radical cure of severe entropium requires a careful adaptation of the surgeon's art to the circumstances of the particular case, and should not be attempted by unskilled hands.

ENTRY, RIGHT OF. A person is said, in English law, to have a right of entry who has been wrongfully dispossessed or ousted of land and tenements by abatement, intrusion, or disseisin. See the several articles under these heads. A right of entry was formerly lost by suffering a descent cast, i.e., where the tenant tortiously in possession is permitted to continue unmolested till his death, and is succeeded by his heir. This result of suffering a descent cast is removed, 3 and 4 Will. IV. c. 27, and right of entry is now lost by not asserting it for twenty years.

ENTRY OF AN HEIR. In the feudal law of Scotland, this term was applied to the recognition of the heir of a vassal by the superior or dominus. Strictly, the whole rights of the vassal in the property return to the superior on his death, and must be renewed to his heir. The renewal, however, is not optional; it is merely an occasion of exacting dues of entry from the heir, which tend, of course, to diminish the value of the property, and of putting fees into the pockets of conveyancing lawyers, who are the only real gainers by the arrangement. See CONVEYANCING.

ENVELOPES. Until the introduction of the penny-postage system, E. for written letters were very little adopted; it was far more customary to secure, by wafer or sealing-wax, the sheet of paper on which the letter was written. When the postage was rendered uniform for all distances, and prepayment enforced, or at least recommended, it was supposed that stamped E. would be convenient coverings for letters, sealing the letter and paying the postage at one operation. Such has indeed been the case; but the envelope-manufacture has since taken a new direction, and to an extent that no one could have contemplated. Several large firms in London and elsewhere can make E. more cheaply than the government, and can vary the size, shape, color, and quantity to an indefinite degree; as a consequence, although E. bearing the government impressed stamp are stilll in demand, the unstamped varieties are used in very much larger quantities. They are made by two methods, involving different amounts of machine-power. The paper is first cut into quadrangular pieces rather longer than wide, by a cutting blade brought to bear upon a pile of sheets at once; and then cutting-dies reduce these pieces to the proper shape, generally lozenge or diamond form, but sometimes with curvilinear edges. For some kinds, it is found to economize both time and paper to stamp the pieces out at once from the rough sheets. The subsequent folding and gumming are performed generally by hand, sometimes by machine. In the hand-method, women and girls fold with almost incredible quickness, having very simple guide-pieces to aid them in giving the proper oblong quadrangular shape to the fold. The gum is applied with a small brush, either along the overlapping edges, or in spots here and there, according to the quality of the envelope.

The envelope-machines, however, such as those of Messrs. De la Rue, are beautiful examples of automatic mechanism. In the kind invented and used by this celebrated firm, a cutting-machine severs the blanks or papers; and dies are employed to stamp the device on the spot where the seal would otherwise lie. The blanks are then fed into the folding-machine, where they pass through a curious series of processes. Each blank is carried down into a box, where a plunger makes four creases in it; two short levers fold down two of the flaps thus made; a gumming apparatus comes up, and applies a line of wet gum to each flap-edge; two small levers then fold down the other two flaps (but only fastening one of them); and finally, the envelope is shifted aside to a pile, and makes way for another. All these processes are gone through in *one second*, enabling the machine to make 60 E. per minute. Where 12 of these machines are working at once, it will be seen that a million E. are put out of hand in a very short time. Nearly a million and a half of enveloped letters pass through the post every *day* in the United Kingdom, most of the E. for which are of home manufacture; and besides this, a large export trade is maintained. The stamped E. all go to Somerset house, to have the stamp impressed upon them, which is done by a beautiful machine, chiefly invented by Mr. Edwin Hill, in which embossing and color-printing are ingeniously combined. These E. are sold by the stamp-office, between which and the post-office a monetary adjustment becomes necessary.

ENVOY, a diplomatic minister of the second order, i. e., inferior in rank to an ambassador. Envoys ordinary and extraordinary, ministers plenipotentiary, the internuncios of the pope, and all other inferior diplomatic ministers, differ from ambassadors in this, that although they receive their credentials, like ambassadors, immediately from their sovereign, they represent not his personal dignity, but only his affairs. They stand to him just as an ordinary agent does to his principal, and their acts or promises are his in a business, though not in a personal sense. It is said that this class of diplomatists was first introduced by Louis XI. of France, towards the end of the 15th century. The E. is superior in rank to the chargé d'affaires, whose credentials proceed from the ministers of the state from which he is sent, and are addressed to the minister of the state to which he is sent; or are a mere delegation from an ambassador

or E. to conduct the affairs of the mission in his absence. Consuls (q.v.) are not generally reckoned among diplomatic ministers, though, where they have diplomatic duties to perform independently of an ambassador or E., they are accredited, and treated as ministers. According to the division of diplomatic agents into four classes, which was made by the great powers at the congress of Vienna in 1815—viz.: 1. Ambassadors, legates, and nuncios; 2. Envoys, ministers, and other agents accredited to sovereigns; and 3. Chargés d'affaires, accredited by and to the departments of foreign affairs—an E. would be of the second, and a chargé d'affaires of the third rank. But the practice of this country has interjected between the ambassador and the E. a second class, called envoys extraordinary and ministers plenipotentiary, which, of course, throws the ordinary E. into the third, and the chargé d'affaires into the fourth class. See CHARGÉ D'AFFAIRES, AMBASSADOR, EMBASSY, and CONSUL.

ENYED. See NAGY-ENYED.

ENZIO, or ENTIUS, 1225–72; king of Sardinia, a natural son of Frederick II. and the beautiful Bianca Lancia; b. at Palermo. He fought by his father's side against the Lombards at the battle of Cortenuova before he was 13 years of age, and the following year was married to Adelasia, the heiress of Sardinia and Corsica, and given the title of king of Sardinia. In May, 1239, he was declared vicar imperial in northern Italy, and commanded the German and Saracen troops in the imperial army; he entered the March of Ancona, and became so formidable a foe to the papacy, that the distinguished soldier-cardinal, John of Colonna, was sent against him. Gregory IX. excommunicated Frederick and his son before the end of the year; and a crusade against them was preached soon afterwards. In 1241, the command of the fleet having been intrusted to Enzio, he gained a splendid victory over the Genoese, sinking three of their vessels and capturing 19. Amongst the captives were three cardinal-legates, and many bishops and archbishops; the booty included the large sums of money which the notorious cardinal Otho had just collected in England. After the death of the pope (August), Enzio was sent with a large army to aid his brother Conrad, king of the Romans, against the invading Tartar hosts; the victory won by the two brothers near the river Delphos finally delivered Europe from the presence of these desolating hordes. Enzio was afterwards sent into Lombardy, which was for several years the scene of his chief exploits. In 1245, he was again excommunicated by pope Innocent IV., and in 1247 he besieged Parma, but was forced to retire. He then besieged Colonna, and in 1249 took the castle of Arola, but, on May 26 of the same year, he was taken prisoner at Fossalta by the troops of Bologna and consigned to perpetual imprisonment. "A captive at the age of 24," says Dean Milman, "this youth, of beauty equal to his bravery—the poet, the musician, as well as the most brilliant soldier and consummate captain—pined out 23 years of life, if not in a squalid dungeon, in miserable inactivity." [From *Encyclopædia Britannica*, 9th ed.]

E'OCENE (*eos*, dawn, and *kainos*, recent), a term introduced by Lyell to characterize the lower tertiary strata, from the idea that the fossil shells of that period contain an extremely small proportion (3½ per cent.) of living species. He accordingly looks upon these beds as indicating the dawn of the existing state of the testaceous fauna—no recent species having been detected in the older rocks. The gradual approximation of the living inhabitants of the globe to the present forms is the chief characteristic of the E. and newer deposits. The E. beds rest on the chalk. Like the other tertiary strata, these deposits occupy small and detached areas when compared with the older measures. It is not difficult to determine the relative position of primary or secondary strata, because of the great extent of particular beds, being frequently continuous over extensive districts. But tertiary deposits are more isolated, and occur in smaller and more detached patches; hence it is difficult to determine the contemporaneity of the sections of the various periods, occurring as they do in different isolated localities. Their relations must be determined from the petralogical structure of the beds, which, however, is very inconstant, or from the more satisfactory evidence derived from their fossiliferous contents.

In the following table are given the generally received divisions of this period, with the maximum thickness (in English ft.) of the English strata, and the French and Belgian equivalent beds:

Upper Eocene	1. Hampstead series	175	Calcaire lacustre supérieur, and Grès de Fontainebleau.—Rupelien.
	2. Bembridge series	115	Gypseous series of Montmartre, Calcaire lacustre moyenne, and Calcaire siliceux.—Tongrien.
Middle Eocene	3. Osborne series	70	Grès des Beauchamp.
	4. Headon series	182	
	5. Bagshot series	1270	Sables moyennes, Calcaire grossier, and Lits coquillières.—Laeckenien and Bruxellien.
	6. London clay series	480	Wanting in France.—Ypresien.
	7. Plastic clay series	160	Argile plastique et lignite.—Landenien supérieur.
	8. Thanet sands series	90	Wanting in France.—Landenien inférieur.
	Total thickness	2542 feet.	

EO'LIAN HARP. See ÆOLIAN HARP.

EON, or EUDO DE STELLA, a religious fanatic of Bretagne in the 12th c., who claimed to be the final judge of mankind. He opposed the hierarchy of the church, and taught that the only true baptism was the baptism of the Holy Ghost given by the laying on of hands. He was believed to have miraculous power, and gained many followers. He was opposed publicly by the cardinal-legate Albericus, and in a book by archbishop Hugo of Rouen. Some of his disciples were burned to death for their heresy. In 1148 he was captured, with some of his leading adherents, and tried before the synod at Rheims, but escaped execution because thought insane. After his death his sect soon died out.

EON DE BEAUMONT, CHARLES GENEVIÈVE LOUIS AUGUSTE ANDRÉ TIMOTHÉE D', known as the *Chevalier d'Eon,* was b. at Tonnerre, in Burgundy, in 1728, studied law, and became an advocate. He attracted the notice of the prince of Conti by some political writings; and in 1755 was introduced by the latter to Louis XV., who employed him in diplomatic missions to Russia and Austria. After serving a short time in the army, not without distinction, he was sent to London in 1761 as secretary of embassy, and shortly after was made minister-plenipotentiary. Becoming the victim of a court cabal, however, which deprived him of his office, he took his revenge by publishing his secret correspondence with the French court, which contained, among other things, libels on various persons. For one of these, he was prosecuted in London; and to avoid judgment, fled to the continent. He, however, returned to England again; but, on the death of Louis XV., the French ministry deemed it prudent to recall him, as they were afraid he might betray their secrets to the English government, which made him brilliant offers. The pretext laid hold of for this purpose, was the scandal excited in London by his having assumed the garb of a woman, which he had done at the request of Louis, the better, it may be presumed, to hide his designs as a "secret agent." On his return to France, however, Eon was very favorably received; and Louis XVI. even ordered him to make use of the feminine garb in future. In 1783, he again proceeded to London, not, however, in any visible official capacity; and, though dressed as a woman, gave lessons in fencing, of which art he was a complete master. On the outbreak of the French revolution, he hastened home, and offered his services to the nation; but as nothing came of his offer, he finally returned to London, where he sank into the greatest misery, and d. 21st May, 1810. An examination of Eon's remains by Mr. J. Copeland, a surgeon, settled the question of his sex, and put an end to the curiosity of the English public. His writings appeared at Amsterdam 1775, under the title of *Loisirs du Chevalier d'Eon.* The *Mémoires* which bear his name are not genuine.

EOO'A, or MIDDLEBURG, one of the Friendly or Tonga islands, is 30 m. in circuit, and contains 300 inhabitants. It is in lat. 18° 19' s., and long. 175° 37' west. The surface, which is rocky and barren, rises 600 ft. above the sea. The group, as a whole, was discovered by Tasman in 1643.

EOS. See AURORA, *ante.*

EÖTVÖS, JOZSEF, a highly distinguished Hungarian author, was b. 3d Sept., 1813, at Buda; educated at home by a tutor of republican sentiments, and studied philosophy and jurisprudence at the university of Pesth during the years 1825–31. He became an advocate in 1833, but soon resolved to devote himself exclusively to literature, in which field he had already won a great reputation by his comedies *Kritikusok* (The Critics) and *Házasulók* (The Weddings), and also by his tragedy *Boszú* (Revenge). After his return from a journey through Germany, France, England, Switzerland, and the Netherlands, he published his *Prison Reform* (*Gefängnissreform,* Pesth, 1838), which was instrumental in bringing about many wholesome improvements in regard to prisons. This was followed (1838–41) by his novel entitled *The Carthusian,* which excited great interest, and was pronounced to be one of the best productions of Hungarian literature. E. now began to distinguish himself in politics. When the liberal party split, in 1844, into municipalists and centralists, he became one of the most eloquent advocates of the policy of the latter party, and wrote numerous articles in favor of it in the *Pesti Hirlap,* which are marked by varied learning, fullness of thought, and elegance of expression. They were issued in a collected form at Leipsic in 1846, under the title of *Reform. The Village Notary* (A' Falu' Jegyzöje, 3 vols., Pesth, 1844–46; English by Otto Weneckstern, 1850; German by Mailath) is a work of the highest order of merit. For variety of incident, easy vigor of style, humor, liveliness, and freshness of descriptive power, it has been pronounced equal to the best of the *Waverley Novels.* It was followed in 1847–48 by his *Magyarország* 1514*—ben* (Hungary in 1514), which describes the insurrection of the peasants that happened in that year in a masterly style. When the revolution of 1848 broke out, E. was appointed minister of public instruction, but soon became aware of his own incapacity for the work of a practical statesman, and abandoning his country, which he deemed it impossible for him to serve, retired for some time to Munich, where he employed himself exclusively in literary pursuits. The most important fruit of his residence here was *Der Einfluss der Ideen des* 19 *Jahrh. auf Staat und Gesellschaft.* In 1851, E. returned to Hungary. In 1859, he published anonymously his *Garantien der Macht und Einheit Œsterreichs.* In 1867, he was appointed minister of worship and education, and in that capacity engaged actively in the work of reform. He d. at Pesth on the 3d of Feb., 1871.

EOZOIC PERIOD. See ARCHÆAN PERIOD.

EOZO'ON, supposed by some paleontologists to be one of the oldest geological representatives of animal life, and by others held not to be an animal. It was a huge mass of lower organization than the sponges or protozoa, and belonged (if to animals) to the *foraminifera*. It was jelly-like, without definite organs, but probably with power to secrete a calcareous shell. Remains have been found in Canadian rocks, whence the name *Eozöon Canadense*, and in the oldest European rocks.

EPACRIDA'CEÆ, a natural order of exogenous plants, consisting of shrubs and small trees, which, both in appearance and in botanical characters, much resemble the *ericeæ*, or heath family. The most important distinguishing structural character is indeed found in the simplicity of the anthers, which are one-celled, open longitudinally, and are destitute of appendages. The flowers of the E. have generally a tubular corolla, dividing into five—rarely four—segments; which, however, sometimes become separate petals. The calyx is persistent, often colored, has the same number of segments with the corolla, and is surrounded with small bracts. The stamens are fewer than in the *ericeæ*, usually equal in number to the segments of the corolla, and alternate with them. The fruit is sometimes a capsule, sometimes a berry, sometimes a drupe. The leaves are simple, generally alternate, often crowded; the flowers in spikes, in terminal racemes, or axillary and solitary.—About 400 species of E. are known, all natives of the Indian archipelago, the South Sea islands, and Australia; in which regions they seem to occupy the place of the heaths of other parts of the world. Some, particularly of the genus *epacri*, are well-known ornaments of our green-houses, and are flowering shrubs of great beauty. Some produce edible berries resembling the cranberry. See CRANBERRY.

E'PACT, in chronology, is the excess of the solar month above the lunar synodical month; or of the solar year above the lunar year of twelve synodical months; or of several solar months above as many synodical months; or of several solar years above as many periods, each consisting of 12 synodical months. The menstrual E. is the excess of the civil calendar month above the lunar month. For a month of 31 days, this E. is 1 day 11 hours 15 minutes 57 seconds, if we suppose new moon to occur on the first day of the month. The annual E. is the excess of the solar year above the lunar. As the Julian solar year is (nearly) 365 days, and the Julian lunar year is (nearly) 354 days, the annual E. is nearly 11 days. The E. for two Julian years is, therefore, nearly 22 days; for three years, 33 days; and so on. When, however, the epact passes 30 days, 30 falls to be deducted from it, as making an intercalary month. For three years, then, the E. is properly 3; and for 4 years, adding 11 days, it is 14 days; and so on. Following the cycle, starting from a new moon on the 1st of Jan., we find that the E. becomes 30 or 0 in the 19th year. The E. for the 20th year is again 11; and so on. The years in the cycle are marked by Roman numerals, I. II. III., etc., called the golden numbers; and a table of the Julian epacts exhibits each year in the cycle with its golden number and epact. As the Gregorian year (see CALENDAR) differs from, and is in advance of, the Julian by 11 days (the number lost on the Julian account before the Gregorian computation of time was introduced in England), and as 11 days is the difference between the solar and lunar years, it follows that the Gregorian E. for any year is the same with the Julian E. for the year preceding it.

EPAMINON'DAS, the most eminent of Theban generals and statesmen, and one who for a long period elevated his country to the highest point of honor and prosperity, was b. 414 B. C. He was descended from an ancient but impoverished family, and led a retired life till his 40th year, profiting by the instructions of Lysis the Pythagorean, who inspired him with enthusiasm for the elevated ideas which it was the object of his life to realize. E. first becomes prominent during the period when the Lacedemonians garrisoned the citadel of Thebes, and kept the inhabitants in subjection. Though he took no part in the desperate but successful stratagem by which his fellow-citizens recovered the *Cadmeia* in 379 B.C., he stepped forward immediately after into the ranks of the patriots; and when sent to Sparta in 371 B.C., along with several others, in order to negotiate a peace between the two countries, E. displayed as much firmness and dignity as eloquence in the debate which ensued upon the question whether Thebes should ratify the treaty in the name of all Bœotia, the result of which ratification would have been equivalent to a recognition of her claim to supremacy over the Bœotian towns. To this the Lacedemonians demurred, and the war was again resumed; E. was appointed commander-in-chief; and, in conjunction with his friend Pelopidas, with an army of 6,000 men, defeated double that number of the enemy at Leuctra (371 B.C.). Two years later, he and Pelopidas marched into the Peloponnesus, incited several of the allied tribes to fall away from Sparta, and then turned his arms against that city, which, however, was bravely defended by Agesilaus. On his return to Thebes, E. was accused of having violated the laws of his country, by retaining the supreme power in his hands beyond the time appointed by law; but was acquitted in consequence of his open and animated defense. In the spring of 368 B.C., the war was renewed with increased fury between Thebes and Sparta, and E. once more marched into the Peloponnesus, but did not accomplish much; and on his return home, received a check from Chabrias at Corinth. To atone for this unsuccessful undertaking, he advanced with 33,000 men into Arcadia,

and joined battle with the main body of the enemy near Mantineia, in the year 362 B.C. E., at the head of his troops, succeeded in breaking the Spartan phalanx, but was mortally wounded in the breast by a javelin. Being told by the physicians that he would die as soon as the weapon was extracted, on receiving intelligence that the Bœotians had gained the victory, he is said to have torn out the javelin with his own hand, exclaiming: "I have lived long enough." His moral purity, justice, and clemency are extolled by the ancients as much as his military talents; and it is expressly recorded of him, that he never told a lie, even in jest. Compare Bauch *Epaminondas und Thebens Kampf um die Hegemonie* (Breslau, 1834); Pomtow, *Das Leben des E.* (1870).

EPANOME'RIA, a t. in Santorini, one of the Grecian islands, built on a steep promontory, so that the houses are ranged in terraces one row above another to the number of 15 or 20. Some are excavations in the rock, and the lowest are 400 ft. above the sea. The place is reached by a winding pathway cut in the face of the cliff, on the summit of which are many windmills.

EP'ARCH, the governor of a province in ancient Greece, or prefect of a region under the rule of Rome. In modern Greece a province of the kingdom is called a nomarchy, and a subdivision of a nomarchy an eparchy. In Russia the term has an ecclesiastical use, denoting the diocese or archdiocese of a bishop or archbishop.

EPAULE'MENT (from the French *épaule*, shoulder), in siege-works, is a portion of a battery or earthwork. The siege-batteries are generally shielded, at one end at least, by epaulements, forming an obtuse angle with the main line of the battery. The object is to protect the guns and gunners from a flanking fire. The name is often given erroneously to the parapet of the battery itself, but it applies properly to the flanking return only. Sometimes the whole of a small or secondary earth-work, including the battery and its flanks, is called an E.; and sometimes the same name is given to an isolated breast-work intended to shield the cavalry employed in defending a body of besiegers.

An *épaule* is the shoulder of a bastion, where one of the faces and one of the flanks meet; and this points to the proper meaning of E., as a shoulder or flanking work.

EP'AULET, from the same French source as epaulement, is a shoulder-knot worn by commissioned officers in the naval profession, both as an ornament and a distinction. In the British navy, the officers of and above the rank of lieutenant wear epaulets of gold lace, one on each shoulder, sub-lieutenants wearing one only. Ranks and degrees are marked in a very systematic way by means of crowns, anchors, and stars worked in silver on the E., and also by the size of the cords of the E. itself. This decoration was formerly universal in the British army, officers wearing those of gold, men of worsted; but they were abolished during the Russian war, in consequence of the danger to which officers thus easily marked out were exposed. It is retained by the French army alone of the armies of the great powers. Militia officers wore epaulets of silver cords.

EPÉE, CHARLES MICHEL, ABBÉ DE L', one of the founders of the system of instruction for the deaf and dumb, was b. at Versailles, 25th Nov., 1712. He studied for the church, and entering into holy orders, became a preacher and canon at Troyes, but eventually, on account of his Jansenist opinions, was deprived of this appointment. He now lived in retirement in Paris. In the year 1755, he first began to occupy himself with the education of two deaf and dumb sisters; and, as he asserts, without any previous knowledge of Pereira's efforts in the cause, invented a language of signs, by which persons thus afflicted might be enabled to hold intercourse with their fellow-creatures. His first attempt being crowned with success, he determined to devote his life to the subject. At his own expense, he founded an institution for the deaf and dumb, and labored with unwearied zeal for its prosperity. His favorite wish, however, the foundation of such an institution at the public cost, was not fulfilled till after his death, which took place 23d Dec., 1789. He wrote a work, entitled *Institution des Sourds et Muets* (2 vols., Paris, 1774), which afterwards appeared in an improved form under the title, *La Véritable Manière d'Instruire les Sourds et Muets* (Paris, 1784).

EPEI'RA, a genus of spiders, the type of a family called *epeiridæ*. They are of those spiders which have only a pair of pulmonary sacs and spiracles; construct webs with regular meshes, formed by concentric circles and straight radii; and are furnished with a pair of almost contiguous eyes on each side, other four eyes forming a quadrangle in the center. Many of them are remarkable for the beauty of their colors and of their forms. Several species abound in our gardens, particularly in autumn. *E. diadema* is one of the largest British spiders. It is found in moors, the borders of woods, etc.; but it is in tropical countries that the *epeiridæ* exist in greatest numbers, and attain the greatest size and beauty, extending from branch to branch their lace-work, remarkable for gracefulness of design. The net, when loaded with wings, wing-covers, and limbs of insects that have been preyed upon, is often loosened, and falls down upon the central nest or den of the spider; and successive nets thus falling down, form at last a ball sometimes as large as a man's head. Some of the spider cords, carried horizontally from tree to tree at a considerable height from the ground, "are so strong as to cause a painful check across the face when moving quickly against them: and more than once," sir J. E. Tennent says, "in riding I have had my hat lifted off my head by a single thread."—Tennent's *Ceylon*.

EPERÏES (Lat. *Fragopolis* or *Eperesinum;* Hung. *Eperjes, Slovak Pressova*), an old t. of Hungary, in the co. of Saros, of which it is the capital, is agreeably situated on the left bank of the Tarcza, about 150 m. n.e. of Pesth. It is surrounded with walls, is the seat of a bishop, and contains some houses of the 15th and 16th centuries, built in the style of those in Naples, with which E. was much connected in the middle ages. Its principal buildings are the church of St. Nicholas, the communal college, with 500 students and a library consisting of 14,000 volumes, and the county hall. It has manufactures of earthenware and of linens and woolens, and has some trade in linen goods, corn, and Tokay wine. In the vicinity are the Sovar saltworks, which produce 5,000 tons of salt annually. Pop. in '69, 10,772, almost wholly Slavonic.

EPERNAY, a t. of France, in the department of Marne, is the headquarters of the *vins de Champagne,* and is situated in the midst of a rich vine-growing district, on the left bank of the Marne, 19 m. w.n.w. of Chalons. It is well built, clean, and well paved. Its environs consist, for the most part, of elegant villas, with vaults attached, belonging to the Champagne wine-merchants. E. manufactures large quantities of earthenware from a clay obtained in the neighborhood, and called *terre de Champagne;* also hosiery, refined sugar, and leather. It has a brisk trade in bottles, corks, wire, Champagne wines, etc. Pop. '76, 15,414.

E'PHAH, a measure of capacity for dry goods in use among the Hebrews. It contained three English pecks and three pints.

EPHEM'ERA (Gr. lasting for a day), a Linnæan genus of neuropterous insects, now forming the family or tribe *ephemeridæ.* They are allied to the *libellulidæ,* or dragon-flies, but differ from them in many very important respects. They have received their name, to which corresponds the English DAY-FLY, sometimes also applied to them, from the brief duration of their existence in the perfect state, in which, very unlike the dragon-flies, they are believed to take no food, merely propagating their species, and dying. From the season of the year in which they begin to be seen, some of them are also called MAY-FLY; and by this name are well known to anglers, who use them, and artificially imitate them as excellent lures for trout. The eggs of the ephemeræ are also a favorite food of fishes; they cohere together in a gelatinous mass. The larvæ and pupæ are aquatic, and in these states the ephemeræ have a much longer life than in their perfect state, extending even to years. The larvæ and pupæ are sufficiently voracious. The abdomen of the larva is furnished on each side with a set of leaflets, which serve instead of gills for respiration, and are also used in locomotion, although there are 6 ft. attached to the thoracic segments. The pupæ differ little from the larvæ except in having rudimentary wings inclosed under scales. Both larvæ and pupæ have the abdomen terminated by two or three jointed filaments, which the perfect insect also has, sometimes very long. The body of the perfect insect is soft and slender; the wings resemble in form those of dragon-flies, but are soft and filmy; in repose, they are elevated vertically above the body; the second pair of wings are much smaller than the first, and in some species are altogether wanting; the organs of the mouth are so soft and small as not easily to be discerned, and to be apparently unfit for any kind of use. Ephemeræ, in their larva and pupa states, live chiefly under stones in water, or in burrows which they make in the banks of streams. When ready for their final change, they creep out of the water to undergo it on some plant or other object by the water-side, generally towards sunset on some fine day of summer or autumn. After having attained their winged state, however, they cast off a complete slough or envelope, so perfect, that it exhibits even the limbs, abdominal filaments, and antennæ; and these "ghost-like exuviæ" are sometimes so abundant in the neighborhood of streams, as to cover in "a pearly layer" the hat and basket of the angler. The multitudes of ephemeræ are often very great, filling the air as a cloud; nay, so abundant are they at times, that their bodies have been known to cover the ground in certain districts of France, and have been gathered from particular spots in cart-loads to be used as manure.

EPHEM'ERA, or FEBRIS DIARIA in Latin (from Gr. *epi* and *hemera,* on a day), a fever which lasts only a single day, or part of a day, and is generally dependent on some slight local irritation. It hardly requires any other treatment than the removal of the cause, if known.

EPHEM'ERIS (Gr. "for the day") is a name applied to almanacs from their containing notices for each day. It is mostly confined to astronomical tables giving the daily places of the sun, moon, and planets, and other phenomena of the heavens. Such tables have become common since the days of Kepler. The first were published by Purbach for the years 1450–61. Those of Regiomontanus, for 1474, were much more accurate, and his ephemerides met with universal acceptance. Similar publications were afterwards made by Leovitius, Origanus, Kepler, and others. The most important works of the kind at present are the French *Connaissance des Temps,* the English *Nautical Almanac,* the Berlin *Astronomisches Jahrbuch,* and the *American Ephemeris and Nautical Almanac.*

EPHE'SIANS, EPISTLE TO THE, is a letter addressed by St. Paul, during his first imprisonment at Rome, to the church which assembled in Ephesus (q.v.). This church had been planted by the apostle himself, and, as we infer from various circumstances

mentioned in the Acts of the Apostles, was an object of his special affection. The epistle was written almost at the same time as that to the Colossians, and consequently breathes the same spirit of exalted piety and fervid faith, besides containing many similar thoughts and exhortations. It may be divided into two grand parts, the first of which is for the most part *doctrinal*, and the second practical. The proofs of its *genuineness* and *authenticity* have generally been considered unquestionable; but some years ago De Wette, in his *Introduction to a Commentary on the Ephesians* (2d edit. 1847), tried to show that this epistle is simply an expansion of the grander epistle to the Colossians, though he admits that it has the appearance of having been compiled in the apostolic age.

EPHESIANS, EPISTLE TO THE (see *ante*), is universally admitted to have been written by the apostle Paul. It is expressly ascribed to him by Ignatius (if indeed any writings attributed to *him* are genuine), who was contemporary with Paul; is alluded to by Polycarp, a friend of the apostle John, and cited by Irenæus, Clement of Alexandria, Tertullian, Origen, and many subsequent writers. Some critics have maintained that it was not addressed to the Ephesians, but either to the Laodiceans or to several churches in common, of which Ephesus may have been one. The reasons which they assign for this opinion are: 1. That Marcion, a heretical writer of the 2d c., asserts that in his copy of the epistle the reading was "in Laodicea," and not "in Ephesus." The answer to this is that as Marcion is known to have altered the text in other instances to suit his own views, he is not to be trusted, especially when all known ancient manuscripts and all ancient versions read "in Ephesus." 2. That as Paul directed the Colossians to read the epistle *from* Laodicea, he must have written an epistle *to* Laodicea, which is either this so-called epistle to Ephesus or else has been lost. To this the answers are: (1) If he did write to Laodicea, it may have been a letter designed for local and temporary use only. As Christ said and did many things which he did not design to have recorded in the small book of the New Testament, why may not an apostle have written some things which were not to have a place there? (2) Paul charged the Colossians to let the epistle which he sent them be read by the Laodiceans; but why would he have wished this so earnestly if at the same time he had written to Laodicea this "epistle to the Ephesians" (which so greatly resembles that to the Colossians), and had intrusted both to the same messenger to be delivered at about the same time? (3.) It is said that if the epistle had been written to the Ephesians, among whom Paul had spent three years of most loving and successful ministry, it could not have been so general in its style, and would have contained personal salutations at the close. To this the answers are: (1) This epistle and that to the Colossians, written at the same time, both show that Paul's thoughts were intent on Colosse, Laodicea, Hierapolis, those whom he had never seen, the Gentiles at large, and God's eternal purpose with reference to them all. In all that he then wrote, therefore, themes of general and permanent interest might naturally prevail to the exclusion of personal and transient things. (2) At the close of the epistle he expressly says that he has committed all matters of a personal nature between himself and his readers to the beloved and faithful brother who was the bearer of the epistle, and whom he sent to them for the very purpose of making them acquainted with his condition and of comforting their hearts. Such provision having been made for loving salutations and all other particulars which his former relations to the Ephesians would prompt, the entire absence of them from the epistle itself is explained.

The doctrinal part of the epistle contains thanksgiving to God for the revelation of his eternal purpose of grace to men; prayer that Christians may receive the full measure of the blessings provided for them; the native character of mankind as dead in sins; regeneration by the grace of God, and the benefits, present and future, resulting from it; salvation by divine grace and not by human works; good works the fruit of regeneration; privileges resulting from the reception of salvation by grace; statement of God's purpose to receive the Gentiles among his people; repeated prayer that Christians may receive the fullness of the blessings provided for them; renewed ascriptions of perpetual glory to God in the salvation of men. The practical part consists of exhortations to Christian unity, progress in the new life, general holiness of conduct and heart, the particular virtues of truthfulness, self-control, honesty, purity in words and deeds, sobriety, cheerfulness, fidelity in the relations of wives and husbands, children and parents, servants and masters, and strenuous maintenance of the spiritual warfare, by strength to be obtained from God and under the protection of the armor which he provides.

EPH'ESUS, one of the twelve Ionic cities of Asia Minor, was situated in Lydia, near the mouth of the river Caystrus, in the midst of an alluvial plain. It does not appear to have been as old as the Trojan war, but its primitive history has been confused by myths. It bore a great variety of names at different times, the principal of which, besides E., were Ortygia and Ptelea. According to Strabo, it was founded by Androclus, son of Codrus, and this is the most probable of the accounts which have come down to us, though others held to the tradition of its Amazonian origin. It was long before E. acquired any political importance, in spite of being a sacred city from an early period. Subdued first by the Lydian, and next by the Persian kings, it was

included, after the death of Alexander the great, in the territories of Lysimachus (281 B.C.), by whom it was greatly strengthened. Ultimately, it came into the possession of the Romans; and in the time of Augustus, when Strabo wrote, it was "the greatest place of trade of all the cities of Asia w. of the Taurus." This was also its condition when visited by St. Paul, who resided here three years; but the destruction of its great temple by the Goths, in 260 A.D., gave it a blow from which it never recovered. In 341, A.D., it was the scene of the *third* general council of the Christian church. Its general history, while a city of the Byzantine empire, was unimportant, and before the days of Tamerlane it had almost completely perished.—The ruins of E. comprise a stadium 687 ft. long, fragments of a great theater (alluded to in the account of St. Paul's preaching in the city), of an odeum or music-hall, and of various walls and towers, belonging to the Greek, Roman, and Byzantine eras. Near the western extremity of the town are also some massive structures, which have since 1868 been carefully excavated, sometimes from beneath 18 ft. of soil. It is now certain that these stand on the site of the famous *temple of Diana*. This marvelous building, one of the seven wonders of the world, was originally built by Chersiphron; but after its destruction by Herostratus on the night (as is said) when Alexander the great was born (356 B.C.), it was rebuilt by the inhabitants in a style of greater splendor than before, the very women contributing their ornaments to secure the necessary funds; yet, notwithstanding this enthusiasm, more than 200 years elapsed before the new edifice was completely finished. It was the largest Greek temple ever constructed. Its length was 425 ft., its width 220, the number of its columns 128, of which 36 were carved, and their height 60 feet. It had an area more than four times that of the Parthenon at Athens, and even the Olympeium was only about two thirds as great. But even more wonderful than the temple itself were the numberless statutes and pictures which it contained, executed by the best masters of Greece. The altar of the goddess was principally adorned with the works of Praxiteles. Plundered of its treasures by Nero, and burned (as has been mentioned) by the Goths, it was most likely finally destroyed by the iconoclasts, in the reign of Theodosius I., who issued his celebrated edict against the ceremonies of the pagan religion 381 A.D. The site of E. is now occupied by some wretched villages, the principal of which is Ayasaluk.—Certain cabalistic words or sayings are said to have been inscribed on the figure of Diana, which being copied and carried about as charms, became known as *Ephesæ litoræ* (Mason's *Anatomie of Sorcerie*, 1612).

EPHOD, a vestment worn by the Jewish high-priest over the *mĕïl* or second (purple) tunic. It consisted of two shoulder-pieces, one covering the back, the other the breast and upper part of the body, not unlike the Greek *epōnis*. Two onyx stones set in gold fastened it on the shoulders, and on each of the stones were engraved the names of six tribes, according to their order. The material of which the E. was wrought was extremely costly and magnificent: "gold, blue, purple, crimson, and fine twined linen." A girdle or band, of one piece with the E., fastened it round the body. Just above this girdle, in the middle of the E., and joined to it by little gold chains, rings, and strings, rested the square oracular breast-plate with the mysterious *Urim and Thummim*. See also HIGH-PRIEST and URIM AND THUMMIM.

Originally intended to be worn by the high-priest exclusively, ephods of an inferior material seem to have been in common use in later times by the ordinary priests. Even David, when bringing the ark back to Jerusalem, appeared in one. There is also mention made of an E. in several passages of the books of Judges and Samuel, where the word must needs stand either for the *whole* priestly apparatus of an illegal service, or simply for a statue or an idol. The Talmud understands this E. to have been a colossal shoulder vestment of gold, to which divine honors were rendered.

EPHORI (Gr. "overseers"), an order of magistrates in ancient times which appears to have originated at Sparta, and to have been peculiar to the Doric governments. When or by whom the E. were first instituted, is a point of great uncertainty. Herodotus attributes their creation to Lycurgus, and Aristotle to Theopompus (770–720 B.C.). Their duty was to superintend the internal administration of the state, especially affairs of justice, for which a particular building was assigned them, called the Ephorion. One of their most important functions was the oversight, at least in part, of the education of youth, for we are told by Athenæus that they inspected the clothing and bedding of the young men. The E. were five in number; they were elected by and from the people—on which Aristotle observes, that through them the *demos* enjoyed a participation in the highest magistracy of the state—and held their office only for one year. Their influence gradually increased, for their powers were so ill defined that it was difficult to say what was *not* under their cognizance and authority. Cicero draws a comparison between the ephoralty of Sparta and the tribunate of Rome, which is not altogether unwarranted by the facts of the case. Ultimately, the kings themselves became subject to the supervision of the ephori. Cleomenes, for example, was brought before them for bribery; Agesilaus was fined, and Pausanius imprisoned; and in extreme cases they could prefer charges against them, and have them tried before the supreme criminal court. They also transacted the negotiations with foreign powers, subscribed treaties, raised troops, "intrusted the army to the king or some other general," and, in fact, acted as the executive of the state. Muller regards the ephoralty as "the principle

of change in the Spartan constitution, and, in the end, the cause of its dissolution." In the hands of the E., the constitution of Sparta certainly ceased to be a genuine aristocracy, and became a sort of oligarchy; but this point is involved in much obscurity and perplexity. Their authority, however, was at last destroyed by Agis and Cleomenes, who murdered the E. for the time being, and restored the old Spartan constitution (225 B.C.).

E'PHRAEM SY'RUS, one of the most celebrated and prolific ecclesiastical writers of the Syrian church. Several accounts of his life have been handed down to us, but they all bear more or less such a legendary character, that the real facts to be gathered from them are but scanty. It appears, then, that Ephraem (Heb. *Ephraim*) was born in the early part of the reign of Constantine the great, "somewhere between the Euphrates and Tigris," most probably at Nisibis. His parents were, according to some, heathens; and Ephraem, repudiating their idolatry at an early age, had to leave their roof. Jacob, bishop of Nisibis, took care of the boy, and undertook his education. His progress in learning was so satisfactory that the bishop was soon able to make him teacher at his own school; and when in 325 A.D. Jacob went to the council of Nicæa, Ephraem accompanied him thither. In 363, Nisibis was ceded by Jovinian to the Persians, and Ephraem first retired into Roman territory, then went to Anid, his mother's birthplace, and finally settled in Edessa (Orfa), where he remained until his death. He is said to have been so poor when he first arrived at Edessa, that he was obliged to take service at a public bath, but he soon became acquainted with hermits of the neighborhood, and adopted their habits; he retired into a cave near the town, and led the life of a recluse. But so great were his piety and asceticism, as well as his readiness to help the poor and tend the sick, that he was looked upon as a saint, and his day is still celebrated, at different dates, in various churches. Among his usual denominations, more especially referring to his teachings and writings, are "Prophet of the Syrians, Column of the church, Harp of the Holy Spirit," etc.; and his name is never mentioned without the "Mor" or "Mari" (Lord, My Master) being prefixed. But for all that, he had no lack of enemies. His burning zeal for preaching and converting led him to attack most fiercely almost every one beyond the pale of his peculiar creed. He spoke and wrote unceasingly against Idolaters, "Chaldees," Jews, and heretics of all kinds, especially Arians, Sabellians, Manichæans, Novatians, etc. Towards the end of his life, he paid a visit to Basil the great, in Cappadocian Cæsarea, who could not prevail upon him to accept of any higher office in the church than a deanery, though he spared no effort to make him bishop. Returned to Edessa, he found plague and famine raging there, and to his over exertions for the relief of the sufferers his death is attributed by some. He expired in the same year with Basil, in 378, not before having given the strictest injunctions that his burial should be of the very simplest description. With respect to the Testament which he is reported to have dictated in his dying hour—much as it has been used for biographical purposes—we can take no notice whatever of it, as it is entirely spurious.

The visit to Basilius, unimportant as it seems, has been of very great moment The legend which surrounds this, as all other incidents of his life, with a halo of miracle, records that the two men, although previously ignorant of each other's language, began to speak them fluently at this interview—Basilius Syriac, and E. Greek. This wonderful circumstance first induced the learned to enter upon the question, whether E., half of whose voluminous works are in Greek, did really understand that language; and further, whether he understood any language but his own, Syriac. If he did not, what view was to be taken of his commentaries on the Bible, of which the Hebrew and Greek texts, as well as the Septuagint and the Greek fathers, must have been a sealed book to him. There were, and are still, great differences of opinion on these points, but it is generally taken for granted now, that he did not understand any language but his own; that he made use of the common Syriac version, the Peshito; that his grammatical and linguistic notes are taken from different Syriac commentaries, and that the Greek portion of his works consists partly of translations made from his Syriac after his death, or even during his lifetime, and partly of interpolations. Both the praise and the blame which have been indiscriminately bestowed upon him as a writer are exaggerated. His chief merit lies in the glowing fervor and the deep piety which he infused into all he wrote, more particularly into his elegiac hymns. Diction and form are poetical throughout, and when not soaring into the infinite, of no mean beauty. The effect is heightened by the matchless simplicity and awing grandeur of the Syriac idiom.

We will now enumerate his principal works and their editions. Those (under his name) in Greek, consist of sermons or homilies, and treatises of an exegetic, dogmatic, and ascetic nature. Photius records that he wrote more than a thousand such sermons; Sozomenos speaks of "300 myriads;" but, as we said before, of those that have come down to us, some are spurious, and others at least suspicious. Gerhard Vossius translated 171 treatises from Greek MSS. found in Italian libraries, into Latin, and published them at Rome, 1589–98, in 3 vols. (There is but one piece in them translated from the Syriac.) They were reprinted in Cologne in 1603, 1619 (1675), and also in Antwerp, in 1619. The first Greek edition appeared in Oxford in 1709, edited from 28 Oxford MSS., by E. Thwaites. The most important of his Syriac works are, besides an infinite variety of homilies, sermons, poems, etc., his commentaries, or rather scholia, on parts

of the Old Testament. Their value to us, however, is limited to their aiding us in explaining and fixing some readings of the Peshito (see PESHITO), and in enriching our critical apparatus. That he also commented on the Gospels is certain, but no MS. has been found as yet, not even in a Greek or Arabic translation. As to the songs and prayers in the Syrian liturgy ascribed to E., they are simply composed in his manner, and betray their comparatively recent origin at the first glance. The principal edition of his works in Syriac and Greek was published in 6 vols. in Rome, under the papal authority (1732–1746).

The principal writers on E. are: Sozomenos, *Hist. Eccl.*, iii. 16; Assemani, *Proleg.* and *Biblioth. Orient.*; Credner, *De Proph. Min. Vers. Syr.* (1827); Lengerke, *Comm. de Ephr. Syr. S. S. Interprete* (Halle, 1828); and *De Ephr. Syr. Arte Hermen.*, etc. (1831). Some tasteful German translations of hymns, by Zingerle, are to be found in the *Zeitschr. d. Deutschen Morgenl. Gesellsch. passim.*

EPHRAIM, the younger son of Joseph by his wife Asenath, and the founder of one of the twelve tribes of Israel. It is possible that he may have received his name, which signifies "double fruitfulness," from having been born during the seven years of plenty. His grandfather, Jacob, shortly before his death, prophesied the greatness of his posterity when giving him his blessing: "His seed shall become a multitude of nations" (Gen. xlviii. 19). After the Israelites had left Egypt, the tribe of Ephraim numbered 40,500 (Numbers i. 32, 33); but from causes not specified, and not discoverable, it had sunk, 40 years later, on the eve of the conquest of Canaan, to 32,500 (Numbers xxvi. 37). Yet it was under the leadership of an Ephraimite, Joshua, the son of Nun, that the Canaanites were subjugated, and the land possessed. This seems to have given the tribe a much higher influence than might have been expected from its numerical strength. We find Judah and Ephraim classed together as taking their inheritance first (Josh. xv. xvi., etc.). The precise boundaries of Ephraim, as of the other tribes, it is impossible to determine. It occupied the center of Palestine, was bounded on the s. by Dan and Benjamin, and stretched from the Jordan on the e. to the Mediterranean on the west. From scattered notices of the Ephraimites in the earlier annals of the Hebrews, we infer that they were, on the whole, jealous of their brethren. This feeling of dissatisfaction at length broke out into rebellion in the reign of Rehoboam, and the new kingdom of Israel, ruled over by Jeroboam, was for the most part merely the kingdom of Ephraim, for the land which lay to the n. of it could hardly be said to be actually in the possession of the tribes whose names it bore, the original inhabitants keeping stubborn hold of their cities and strongholds. See the article JEWS.

EPI, or GIROUETTE (Fr.), a species of ornamental ironwork with which the cones of pavilions or pointed roofs are sometimes surmounted in the renaissance style of architecture. One of the finest examples is that which surmounts the Tourelle aux Pastorals at the hôtel de Bourgtheroulde in Rouen.

EPICHARMUS, a famous Greek poet, was b. in the island of Cos, in the 5th c. B.C. At first, he studied philosophy under Pythagoras; but a residence at Megara, the native soil of comedy, gave him a taste for that branch of the drama. After the destruction of Megara, in 484 B.C., he removed to Syracuse, where, at the court of Hiero, he spent the remainder of his life. From this circumstance, he is often mentioned by the ancients as a Sicilian. Almost nothing else is known of his personal history except that he died at the age of 90, or as some say, of 97. The date of his death, as of his birth, is unknown. E. is called by Theocritus the father of comedy, and Plato assigns to him a place among comic writers as high as that of Homer among epic poets. He certainly did a good service in excluding, to a large extent, from his dramas the vulgar buffoonery which disgraced all previous comedies, and in introducing a regular plot in which the *comus* or band of revelers sustained the dialogue. None of E.'s works survive entire; but we possess several fragments and the titles of thirty-five. They embraced a wide variety of topics, mythological, social, and political. From one of them, Plautus borrowed the plot of his *Menæchmi*, which shows a great amount of constructive skill. The fragments of E. have been collected and edited by H. P. Krusemann (Haarlem, 1834). Compare Lorenz, *Leben u. Schriften des E.* (1864), and Guigniant, *Histoire del a Comédie Antique* (1863).

EPIC POETRY (Gr. *epos*, a word, a discourse, or narrative). The two chief kinds of poetry are E. P. and lyric poetry. E. P. has outward objects for its subject, of which it gives an imaginative narrative. The events themselves may be partly real and partly fictitious, or they may be altogether fictitious. Lyric poetry, on the other hand, sets forth the inward occurrences of the writer or speaker's own mind—his feelings and reflections. No composition, perhaps, answers, in all its parts, to the one of these descriptions, or to the other; but a piece or poem is classed as epic or lyric according to the element that predominates. Under each of these grand divisions, or genera, there are subdivisions, or species. The longer poems of the epic genus embrace an extensive series of events, and the actions of numerous personages. The term *heroic* epic, or *heroic* poem, is properly applied to such works as the *Iliad* and *Odyssey* of Homer, Virgil's *Æneid*, Tasso's *Jerusalem Delivered*, Ariosto's *Orlando Furioso*, and others, which describe the achievements of the gods and heroes of antiquity, or of the little less mythic knights of mediæval chivalry. Poems, again, like Milton's *Paradise Lost* and Dante's

Divina Commedia, are *sacred* epics. Byron's *Childe Harold*, with the length and narrative structure of an epic, abounds in reflection, sentiment, and satire, and thus is, in substance, as much lyric as epic. Productions like those now named, formed the class of grand epics, or epic poems, by way of eminence. But there are several species of minor poems which, from their nature, must also be ranked as epics. One of these is the *Idyl*, a term applied to what is called *pastoral poetry*, or to descriptions in general of natural scenery, and of the actions and manners of men in calm, ordinary life. Burns' *Cotter's Saturday Night*, Goldsmith's *Deserted Village*, and most of Crabbe's poems, are idyls; so are poetical epistles. The *ballad* (q.v.) is another species of minor epic.

Attempts at epic poetry are now rare, the spirit of the age being against that form of composition. Instead of epic poems, we have *novels*, which, so far as subject is concerned, may be considered as the epics of modern civil and domestic life.

EPICTE'TUS, a celebrated disciple of the Stoa, was born at Hierapolis, in Phrygia, about fifty years after the birth of Christ. He was at first the slave of Epaphroditus, a freedman of Nero, at Rome, whose abusive treatment he is said to have endured with the composure characteristic of the set to which he belonged. He was afterwards manumitted, and devoted himself to the Stoic philosophy. Domitian hated him on account of his principles, and banished him, along with several other philosophers, from Rome. E. settled at Nikopolis, in Epirus. Under the pressure of the times in which he lived, his serious moral views received a character rather of self-denial than of energy; to renounce, to endure, and not to set the mind upon anything beyond the power of the individual to attain, being the points chiefly insisted on. His pupil, Arrianus, collected the maxims of E. in the work entitled *Encheiridion* ("handbook") and in eight books of commentaries, four of which are lost. The peculiar excellence of the writings of E. consists in their simple and noble earnestness. The real heartfelt love of good and hatred of evil which we are in the habit of supposing an exclusively Christian feeling, does manifest itself very finely and beautifully in these, yet, as prof. Brandis says, "there is not a trace in the *Epictetea* to show that he was acquainted with Christianity, and still less that he had adopted Christianity, either in part or entirely." Some of his opinions, moreover, are essentially Christian in their nature, though, of course, they are unconnected with the facts of revelation. E. believes in our "resemblance" to God, in our "relationship" to him, and in our "union" with him through the coincidence of the "will" and the "soul;" he recognizes the contest between good and evil, the life-struggle in the heart, the divine life against which the law in the members wars; and he affirms the necessity of "invoking God's assistance in the strife," that the inner life may become pure as God is pure. There are several good editions of the works of E., the most complete of which is that of Schweighaüser (Leip. 1800).

EPICU'RUS, AND EPICURE'ANISM. Epicurus, an illustrious Greek philosopher, was b. in the island of Samos, 341 B.C., seven years after the death of Plato. His father, Neocles, is said to have been a schoolmaster, and his mother, Chœrestrate, to have practiced arts of magic. At the age of 18, he repaired to Athens, where it has been supposed that he may have had for his teacher Xenocrates or Theophrastus, or perhaps both, but he himself used to declare that he was self-taught. Of the older philosophers, he was most attached to Anaxagoras and Democritus, his system of physics being evidently built upon the atomic speculations of the latter. E.'s stay at Athens on this occasion was short. At Mitylene, in his thirty-second year, he first opened a school; and there and at Lampsacus he taught for five years. In 306 B.C., he returned to Athens, and established a school of philosophy in a garden which he purchased and laid out for the purpose. From this circumstance, his followers were called the "philosophers of the garden." Although E. laid down the doctrine, that *pleasure* is the chief good, the life that he and his friends led was one of the greatest temperance and simplicity. They were content, we are told, with a small cup of light wine, and all the rest of their drink was water; and an inscription over the gate promised to those who might wish to enter no better fare than barley-cakes and water. The chastity of E. was so incontestable, that Chrysippus, one of his principal opponents, in order to deprive him of all merit on the score of it, ascribed it to his being without passions. The calumnies which the Stoics circulated concerning him are undeserving of notice, and were at no time generally believed. E.'s success as a teacher was signal; great numbers flocked to his school from all parts of Greece, and from Asia Minor, most of whom became warmly attached to their master, as well as to his doctrines, for E. seems to have been characterized not less by amiability and benevolence than by force of intellect. He died 270 B.C., in the seventy-second year of his age.

E. was a most voluminous writer. According to Diogenes Laertius, he left 300 volumes. Among others, he had 37 books on natural philosophy, a treatise on atoms and the vacuum; one on love; one on choice and avoidance; another on the chief good; four essays on lives; one on sight; one on touch; another on images; another on justice and the other virtues, etc. Almost all these works are lost: the only writings of E. that have come down to us are three letters, and a number of detached sentences or sayings, preserved by Diogenes Laertius, in his life of the philosopher. The principal sources of our knowledge of the doctrines of E., besides the above letters, etc., are Cicero, Sen-

eca, and, above all, Lucretius, whose great poem, *De Rerum Natura*, contains substantially the Epicurean philosophy.

Although the majority of E.'s writings referred to *natural* philosophy, yet he was not a *physicist*, properly speaking. He studied nature with a *moral* rather than with a *scientific* design. According to him, the great evil that afflicted men—the incubus on human happiness—was FEAR; fear of the gods and fear of death. To get rid of these two fears, was the ultimate aim of all his speculations on nature.

The following is a brief account of his views. E. regarded the universe (*Tŏ Pān*) as corporeal, and as infinite in extent, and eternal in duration. He recognized two kinds of existence—that of bodies, and that of *vacuum*, or space, or the intangible nature. Of his bodies, some are compounds, and some atoms or indivisible elements, out of which the compounds are formed. The world, as we now see it, is produced by the collision and whirling together of these atoms. He also held the doctrine of perception by *images* (Gr. *eidōla*), which are incessantly streaming off from the surface of all bodies, and which are necessary to bring us into *rapport* with the world without. In like manner, he believed that sounding bodies threw off emanations, by which we are brought into sympathy with them; and that perception by smell took place in the same way. In psychology, E. was a decided materialist, holding, for various reasons, that the soul is a bodily substance, composed of subtile particles, disseminated through the whole frame, and having a great resemblance to spirit or breath with a mixture of heat.

In seeking to understand the phenomena of the heavens, E. has no scientific end in view; his sole object is to enable the mind to account for them to itself, without the necessity of imagining any supernatural agency at work. "The phenomena of the heavens," says E., "admit of various causes being assigned for their production, equally conformable to the facts learned from the senses. If, then, in thinking of any appearance, we suppose it brought about by the same cause that produces another appearance which gives no alarm or uneasiness, we are as much delivered from uneasiness as if we *saw* that such is the cause of it." E. did not deny that there are gods, but he strenuously maintained, that as "happy and imperishable beings," they could have nothing to do with the affairs of the universe or of men. "Beware," he says, "of attributing the revolutions of the heaven, and eclipses, and the rising and setting of stars, either to the original contrivance or continued regulation of such a being. For business, and cares, and anger, and benevolence, are not accordant with happiness, but arise from weakness, and fear, and dependence on others."

E. next proceeds to deal with the fear of death, Having proved in his psychology that the dissolution of the body involves that of the soul, he argues that the most terrible of all evils, death, is nothing to us, "since *when we are, death is not; and when death is, we are not*. It is nothing, then, to the dead or the living; for to the one class it is not near, and the other class are no longer in existence." Whether E. actually succeeded in removing the terrors of death by his syllogism, may be doubted.

The *positive* part of E.'s system may be noticed in a few words. He held that *pleasure* was the chief good, and it is from a misapprehension of the meaning of this word as used by E. that the term Epicurean came to signify one who indulged his sensual appetites without stint or measure. At the same time, it is easy to see that the use of the word "pleasure" was calculated to produce the mischievous results with which the later Epicureanism was charged. According to E., the sources and tests of all ethical truth are the feelings (*pathe*), and these are two, pleasure and pain. We delight in the one, and avoid the other instinctively. "When we say that pleasure is the end of life, we do not mean the pleasures of the debauchee or the sensualist, as some from ignorance or from malignity represent, but freedom of the body from pain, and of the soul from anxiety. For it is not continuous drinkings and revelings, nor the society of women, nor rare viands, and other luxuries of the table, that constitute a pleasant life, but sober contemplation that searches out the grounds of choice and avoidance, and banishes those chimeras that harass the mind." But, on the other hand, E. says: "If the means to which sensualists owe their pleasures dispelled the anxieties of the mind . . . . and enabled them to set limits to their desires, we should have no grounds to blame them for taking their fill of pleasure, wherever they could find it, provided it were attended with no pain or grief from any quarter; for that is the only evil." The whole question of ethics, then, comes to a calculation and balancing of pleasures and pains; in other words, the cardinal virtue is *prudence*. E. rests *justice* on the same prudential basis as temperance. Denying any abstract and eternal right and wrong, he affirms that injustice is an evil, because it exposes the individual to disquietude from other men; justice is a virtue, because it secures him from this disquietude. "Injustice is not an evil in itself, but becomes so from the fear that haunts the injurer of not being able to escape the appointed avengers of such acts." The duties of friendship and good-fellowship are inculcated on the same grounds of security to the individual.

Among the Romans, the system of E. was adopted by many distinguished men. Horace, Atticus, and Pliny the younger were Epicureans; and the splendid poem of Lucretius must have recommended the system to many. In modern times, Epicureanism was reuscitated in France by Pierre Gassendi, who published an account of E.'s life and a defense of his character in 1647. Many eminent Frenchmen have professed his

principles; among others, Molière, Saint Evremond, count de Grammont, the duke of Rochefoucauld, Rousseau, Fontenelle, and Voltaire.

EPICY'CLE. The earlier astronomers assumed that all the motions of heavenly bodies took place in circles, the circle being held to be the most *perfect* of all curves; and a necessary consequence of this assumption was, that the motions must have a uniform velocity. Another part of the hypothesis was, that all the heavenly bodies moved round the earth, which remained at rest in the center. The observed phenomena of the heavens, however, were soon seen to stand in glaring inconsistency with these assumptions; and to remedy this, it was necessary to have recourse to additional assumptions. For the sun and moon, which manifestly do not always move with the same velocity, the eccentric circle (q.v.) was imagined. The case of the planets, whose motions were seen to be sometimes direct, sometimes retrograde, and sometimes altogether arrested, offered still greater difficulties; to get over which, the idea of *epicycles* was hit upon. According to this hypothesis, while a planet was moving in a small circle, the center of that small circle was describing a larger circle about the earth. This larger circle was called the *deferent*, and the smaller, which was borne upon it, was called the *epicycle* (Gr. *epi*, upon). In this way the motions of the planets about the earth were conceived to be something like what the motion of the moon about the sun actually is. By assuming proper proportions between the radii of the deferent circle and the E., and between the velocities of the two motions, it was found possible to account pretty satisfactorily for the above mentioned appearances and irregularities in the motions of the planets. But it is only the irregularities arising from the revolution of the earth about the sun that can be at all explained in this way, and not those arising from the elliptic motions of the planets about the sun, nor yet the inequalities of the moon's motions. The successors of the Greek astronomers, down to Tychs Brahé, continued, therefore, to increase the number of epicycles, setting one circle upon another, until the hypothesis, in itself complicated, became still more so, and made the simplicity of the Copernican system at once striking.

EPICY'CLOID is the name of a peculiar curve. When a circle moves upon a straight line, any point in its circumference describes a cycloid (q.v.); but if the circle moves on the convex circumference of another circle, every point in the plane of the first circle describes an E.; and if on the concave circumference, a hypocycloid. The circle that moves is the generating circle; the other, the base. The describing point is not necessarily in the circumference of the generating circle, but may be anywhere in a radius or its prolongation. This curve was first investigated by the Danish astronomer Römer. It has many remarkable properties, and is even useful in the practical arts. The teeth of wheels in machinery must have an epicycloidal form, in order to secure uniformity of movement.

EPIDAM'NUS. See DURAZZO.

EPIDAU'RUS, a t. of ancient Greece, on the eastern shore of the Peloponnesus, in the district of Argolis, was situated on a small promontory, 15 stadia in circumference, in the Saronic gulf, in lat. 37° 38′ n., long. 23° 10′ east. During the most prosperous period of Grecian history, E. was an independent state. It was colonized first, it is supposed, by Carians (hence the older name of *Epicarus*, according to Aristotle), and afterwards by Ionians, but was subsequently invaded by a Dorian army under Deiphontes, the son-in-law of Temenus the Heracleide. This force dethroned Pityreus, the Ionian king of E., compelled him and his citizens to retire to Athens, and inaugurated the Dorian rule, which preserved the ascendency at E. during the whole of the historical period. The form of government was originally monarchical, but after many vicissitudes, it eventually became and remained oligarchical. At an early period, E. became one of the chief commercial cities of the Peloponnesus. It colonized the islands of Cos, Calydnus, and Nisyrus, as well as the town of Ægina, which, during the 6th c., attracted all its commerce from the then declining mother-city. E. was chiefly famous for its temple of Æsculapius, to which patients resorted from all parts of the Hellenic world, seeking cures for their diseases. The site of this temple was a plain surrounded by mountains, about 5 m. w. of the town, and which is still called Hieron, the sanctuary. E. had also numerous temples, among which were those of Artemis, Dionysus, Aphrodite, and Hera, and a magnificent theater, at present in a more perfect state of preservation than any in the Peloponnesus, and with sufficient accommodation for 12,000 spectators.

E. (modern Greek, *Epidavro*) is now a small village, with scarcely 100 inhabitants, employed for the most part in raising vegetables for the Athenian market. The plain surrounding the village is productive and highly cultivated. Here, in Jan., 1822, a congress from all parts of Greece assembled, and promulgated the constitution, known as the constitution of Epidaurus.

EPIDEM'IC (Gr. *epi* upon, and *dēmos*, the people), a disease which attacks numbers of persons in one place simultaneously or in succession, and which in addition is observed to travel from place to place, often in the direction of the most frequented lines of communication. Many E. diseases are also contagious, and all of them suggest the necessity of careful inquiry into the ventilation, drainage, food, drink, and habits of the persons liable to be affected. In presence of an E., it is proper to take unusual precautions to

preserve the public health (see article HEALTH), and not unfrequently the organization of a regular house-to-house visitation of the locality is calculated to do much good, by directing the minds of the poor and ignorant to their duties in respect to themselves and to each other. See ENDEMIC for further observations on this subject; also CONTAGION, INFECTION, FEVER, CHOLERA, etc.

EPIDEMIC CEREBRAL MENINGITIS is a disease which has been noticed and described by many American physicians since the year 1811, when Dr. North specially drew the attention of the profession to it. In 1838–40, it appeared in France, and committed great ravages in Versailles, where the mortality was 28 per cent; in Strasburg, where the mortality was 42 per cent; in Lyons, Nancy, and other garrison towns. The patients, in these cases, were almost entirely young conscripts; and the disease was regarded as non-infectious. In the spring of 1846, it appeared in the Dublin and Belfast workhouses, boys under 12 years of age being the only victims, while girls under similar circumstances escaped; it likewise appeared in the constabulary depot, in the same year, amongst the recruits. In 1863, it was very fatal in the United States. In 1865, it ravaged West Prussia: of 2,000 cases recorded, half died; and of 347 cases, 330 were under 14 years of age. In this epidemic, no mention is made of the purple spots which excited such alarm in Ireland; and in the United States, two forms of the disease are recognized —one marked by shock, weak pulse, purpled limbs, and coma, death happening within the first day; the other presenting signs of cerebro-spinal mischief, such as tetanoid spasms, and death here occurring in three days. Purple spots were present in 27 out of 44 cases.

We now pass to the consideration of the so-called *black death*, which, during the two years 1866 and 1867, caused such intense alarm in Ireland, and especially in Dublin. The history of this disease is as follows: A healthy medical student, aged 19, residing in Dublin, fell ill with chilliness and *malaise* about noon on Mar. 18, 1866. When he was visited in the evening, it was found that he had vomited frequently and was very prostrate; purple blotches appeared on his skin during the night, and about noon next day, he suddenly fell into stupor, and was dead at two, or about 26 hours from the apparent commencement of the symptoms. Drs. Stokes and Benson, who, with Mr. Croly, saw the case, at once recognized it as presenting a novel type of disease. A girl, aged 18, presented similar symptoms on April 2, but recovered. Fatal cases were recorded on May 12, 13, and 17. According to Dr. Mapother—from whose excellent report "On the malignant purple fever epidemic in Ireland," read before the epidemiological society in July, 1867, the materials of this article are almost entirely drawn—it appears that 63 fatal cases had been registered (up to July) in the Dublin district, exclusive of eight deaths amongst soldiers. This able physician gives the following description of the symptoms, which include two types of very different severity, and in this respect he agrees with the American observers. In the graver, life is rapidly extinguished as if by a blood-poison; in the milder, the symptoms are those of inflammation of the cerebro-spinal axis, or its membranes. Dr. Stokes, however, regards these latter phenomena as secondary to the essential disease, and believes that they will always appear, if the patient lives long enough for their development. The earliest symptoms are chilliness and a sense of impending danger, and vomiting of a persistent character soon follows. There is constipation till shortly before death, when the evacuations are involuntarily discharged. The tongue is dry; the pulse abnormally compressible, and usually over 100. The dark purple blotches, caused by the escape of dissolved hematine (coloring matter of the blood) from the smaller vessels, are situated in and under the true skin of the legs, hands, face, back, and neck. These patches vary in size from that of a pin's head to that of a walnut, and are often sufficiently raised to be detected by the touch. The skin is dusky and moist, sometimes even bathed in sweat. In some cases, stupor, and in others, delirium and intense restlessness, are the forerunners of death. The rapidity with which this disease runs its course is appalling. A healthy boy, aged 10½ years, sank in less than 5 hours from the time of his seizure; and of 41 investigated fatal cases, 14 terminated within 24 hours. Of these cases, 21 were females, and 20 males. Youth predisposes very strongly to the disease. No position in life affords exemption; one young nobleman, three medical students, two undergraduates, and several inhabitants of the lowest hovels—the seats of typhus and cholera—were amongst the victims.

With regard to treatment, almost every kind has been tried, and each has been found equally unavailing. The external application of cold to the spine and head, as advocated in various forms of disease by Dr. Chapman, deserves a trial. Dr. Mapother suggests that the disease is due, like scurvy, to the want of fresh vegetables as an article of food; and if this view is correct, it is satisfactory to feel that if this terrible malady is incurable, it is at all events preventable. A few cases of this disease have been recorded as occurring quite recently in various parts of England. They would probably have passed unnoticed but for the Dublin epidemic.

EPIDEMIC MENTAL DISEASES. When we consider how ordinary and normal thoughts and emotions spread from one man to many, and sway multitudes to the same views and actions, it is no longer a mystery that morbid conditions of the mind should become at times no less epidemic than physical diseases. Such, at least, is the fact. A

mental disorder may spread from man to man, and may involve whole nations. It depends for its propagation, like an epidemic disease, first upon external circumstances, and secondly, upon the peculiar condition or constitution of the individuals affected. Like the bodily affection, the causes which provoke the insanity and the tendency to be affected may have been in process of development for years. Both attack the weak rather than the strong; both exist for a season, and disappear. In the case of the mental malady, the external influences—those which constitute the moral atmosphere—are ignorance or imperfect knowledge, the power of one mind over another, the influence of language, the diffusion of particular opinions, the tendency to imitate. It is probable, however, that physical causes exercise an important influence in the production of such general mental conditions. In 1842 and 1844, there occurred in Germany and France, among the military, epidemics of meningitis with delirium, or inflammation of the membranes of the brain, when no moral factors were at work, but when diet, temperature, etc., were. But even where the origin cannot be so distinctly traced, the co-operation of external as well as psychical agents may be legitimately predicated. It would accordingly be illogical to limit the production of the dancing mania (q.v.), which occasionally, during several centuries, swept over Europe, to the reaction succeeding the dread of the end of the world, which had previously prevailed epidemically. An examination of about a hundred manifestations such as that alluded to, collected from various sources, demonstrates that not merely the intoxication of joy, but the most absurd forms of belief—that dreams, delusions, superstitions, corruptions of language, all instincts and passions, even movements and cries, may assume the forms, and, to a certain extent, may follow the laws of epidemic diseases. In far-distant ages, there are records of a histrionic plague, when, after a summer of intense heat, all conceived themselves players, and traversed the streets, and sunk and died, repeating verses, and exhibiting extravagant gesticulations; of whole communities being stricken with nightmare, which was so general as to be supposed and called contagious. There have been epidemics of homicidal and suicidal mania. In one age, hundreds are found possessed by Satan; in another, larger numbers converted into wolves; and in recent times, the leaping ague of Forfarshire, and outbursts of pyromania in various places, remind us that there may be still in the constitution of the human mind, and in the education and the habits of life prevailing, elements capable of realizing the catastrophe suggested by bishop Butler's question: What is to prevent a whole nation becoming mad? The instances of epidemic mental disease recorded in the following table, have been selected from a vast number of others, with a view of showing not the frequency or extent of such affection, but the range of the phenomenon through the powers and propensities of our nature.

Popular Name.	Form of Disease.	Year.	Number Affected.	Authority.
St. Vitus's—St. John's Dance...	Choreamania	1374	Hundreds	Hecker.
Wolf-madness.....	Lycanthropia	1523	"	Calmiel.
Possession.....	Demonomania	1642, etc.	"	"
Convulsionaries of St. Medard.	Theomania	1731	"	"
Incendiarism.....	Pyromania	1800	Many	Marc.
Witchcraft.....	Demonopathia	Various	Thousands	Various.
Suicide.....	Melancholia	"	"	Esquirol.
Visions.....	Delusions	"	Many	Brierede. Boismont.
Timoria, Panic.....	Panphobia	1845	Many	*Edin. Review*, 1849.

There appears to be no guarantee that the present and future generation shall be exempted from similar visitations, except in the universal diffusion of knowledge and sound thinking, for it is invariably in the darkness of ignorance or in the twilight of imperfect knowledge that the moral plague comes.—Hecker's *Epidemics of the Middle Ages;* Calmiel, *De la Folie considerée sous le Point de Vue Pathologique, Philosophique, Historique et Judiciaire, depuis la Renaissance des Sciences en Europe jusqu'au dixneuvième Siècle,* etc.; and *Psychological Journal, passim.*

EPIDENDRUM, a genus of epiphytic orchids, of which there are two examples in the United States, one growing upon magnolia trees. The blossoms are greenish-purple, growing in large clusters. Some of the many species in the tropics are very showy, and some have cathartic qualities.

EPIDERMIS (Gr. *epi,* upon, and *derma,* the skin), a semi-transparent membrane, containing neither vessels nor nerves, and everywhere forming an external covering to the corium or true skin. See SKIN. The E. is called in ordinary language the *scarf-skin.* It consists of two layers, chemically and morphologically distinct—viz., the *mucous layer,* which lies immediately upon the corium, and the *horny layer,* which forms the outermost surface of the body.

The *mucous layer* (known formerly as the *rete mucosum s. malpighianum*) is of a whitish or slightly brown tint (in the negro, dark gray or black), and is composed of small soft cells. The innermost of these cells, resting on the surface of the corium, are elongated and arranged perpendicularly; upon these follow elongated or roundish cells in many layers, which, in proportion to their distance from the corium, acquire, from

their mutual pressure, a polygonal form, which may even be recognized in individual cells.

All the cells in the mucous layer are nucleated vesicles distended with fluid, and likewise containing minute granules, which diminish in number in the more external cells.

The *horny layer* forms the external semi-transparent part of the E., which in the white races is colorless, and is composed almost wholly of uniform cells, metamorphosed into plates or scales. The deepest plates in some degree resemble the uppermost cells of the mucous layer; but in the second or third layer we find the flattening commence; till at length, after a gradual series of modifications, we have the hard, horny scales which occur on the surface, where they are regularly cast off with more or less rapidity, and replaced by those beneath them.*

The color of the E. differs in different persons and in different parts of the body. It is deepest around the nipple, especially in women during pregnancy and after they have borne children. A more or less dark pigment is often deposited, in persons who are exposed to the sun, in the face, neck, back of the hands, etc. These tints are not produced by special pigment-cells, but are seated in the common cells of the mucous layer, round whose nuclei granular pigment is deposited. In the negro and the other colored races, it is also only the E. which is colored, while the *corium* completely resembles that of Europeans. The perpendicular cells are the darkest, and form a sharply marked fringe at the edge of the clear corium. To these succeed brown cells, which accumulate in the depressions between the papillæ, and as we approach the horny layer, we have yellowish cells. The horny layer of the negro also inclines to a yellow or brownish tint.

Morbid coloration of the E. (freckles, mother's marks, etc.) is produced in the same way as the color of the negro's skin. Numerous instances of partially or entirely white negroes and of black Europeans, not as a consequence of change of climate but as an abnormal condition of the skin, are on record.

The thickness of the E. varies extremely. While upon the cheeks, brow, and eyelids, it varies from $\frac{1}{75}$th to $\frac{1}{50}$th of a line, on the palm of the hand it ranges from $\frac{1}{4}$d to $\frac{1}{2}$ a line, and on the sole of the foot sometimes even exceeds a line. In some parts of the body the horny layer is thicker than the mucous; in other, the mucous is the thicker of the two. As the chief use of the E. is that of affording protection to the soft and tender subjacent parts, it attains its greatest thickness on those portions of the body (the palm of the hand and the sole of the foot) which are most exposed to pressure and friction.

In *plants*, as in animals, the E. is formed of flattened cells, of which also new layers are continually produced from the bark below, whilst the outer ones dry up, lose their vitality, and peel off, crack and split off, or otherwise become separated from the living organism. The cells of the E. are often enlarged outwards, so as to form projections, sometimes very slight, sometimes elongated into hairs (q.v.). Glands (q.v.) are also connected with the E., sometimes by the intervention of hairs, sometimes without, and in this way it contributes to the secretion of substances formed in plants by the wonderful chemistry of nature, and on which their value to man often greatly depends. The cells of the E. are usually filled with a colorless fluid, but resinous and waxy substances are sometimes found in them, and sometimes silica (as in grasses and equisetaceæ), sometimes carbonate of lime (as in the *charas*). The epidermis is pierced by *stomata* (q.v.). When the E. of plants is subjected to prolonged maceration, it can often be made to separate into two parts; one, which is more strictly called the E., being the inner, lower, and thicker membrane; the other, which is called the *pellicle* or *cuticle*, being very thin, and extending continuously over every part of the plant except where it is pierced by the stomata. Thus, this superficial pellicle invests even the finest hairs. In some of the *algæ*, it seems to constitute the whole integument. In the greater number of plants, the E. is thin and soft, but sometimes it is thick, and sometimes hard.

EP'IDOTE, a mineral allied to garnet, composed of silica and alumina, with a considerable proportion of lime, or of peroxide of iron, or of peroxide of manganese. These diversities of composition constitute three very distinct varieties; and of these there are sub-varieties, differing in color and other particulars (*pistacite, bucklandite, withamite, zoisite*, etc.). E. is sometimes found massive, foliated, columnar, granular, or incrusting; often crystallized. Its crystals are prisms, variously modified. Its prevalent colors are green, yellow, and gray, but some of the varieties are red and black. It is found in gneiss, syenite, trap, and other rocks in a number of localities in Scotland, and in many parts of the world.

EPIGÆA REPENS. See ARBUTUS.

EPIGAS'TRIUM (Gr. *epi*, over, and *gastēr*, the stomach), the part of the abdomen (q.v.) which chiefly corresponds to the situation of the stomach, extending from the

* In reptiles and amphibians, this layer is periodically cast off in a more or less entire state, a new one being previously formed beneath it; and in man, desquamation in large patches often occurs after certain diseases, especially scarlatina.

sternum towards the navel or umbilicus (q.v.), and bounded on each side by the hypochonders (q.v.). It is called in popular language the pit of the stomach.

EPIGENESIS (Gr. *epi*, upon, and *genesis*, a formation), a formation upon, or in addition to, previously existing parts. The word is applied in physiology to that theory of new formations in organized beings which supposes them to spring from superadded centers of vital activity, as opposed to the theory which presumes that the new is formed by a development or modification of the old structure. See REPRODUCTION.

EPIGLOTTIS. See LARYNX.

EPIG'ONI, in general, sons of descendants, applied more particularly to certain mythical chiefs who fought against Thebes. After the catastrophe which brought about the death of Jocasta and the blinding of Œdipus, Eteocles, and Polynices, the sons of Œdipus and Jocasta incurred the wrath of their father, whom they sent forth alone and blind to fight with poverty. The father's curse rested on them, and resulted in the famous "war of the seven against Thebes." All the chiefs who led the war were slain except Adrastus. A second war was undertaken by the children of the fallen chiefs, and this is known as the "war of the Epigoni." The Epigoni were victorious, and Thebes was taken, Thersandrus, the son of Polynices, being seated on the throne of Cadmus. In literary history, the term E. is sometimes applied to a scholar who limits himself to unfolding the ideas of the great masters of a previous age.

EPIGRAM, a word derived from the Greek, and literally signifying an "inscription." In point of fact, the epigrams of the Greeks were simply inscriptions on tombs, statues, and monuments, written in verse, and marked by great simplicity of style, but having nothing in common with what now passes under the name. It was among the Romans that the epigram first assumed a satirical character. Catullus and Martial are reckoned the best Latin epigrammatists. In modern times, an epigram is understood to be a very short poem, generally from two to eight lines, containing a witty or ingenious thought expressed in pointed phraseology, and in general reserving the essence of the wit to the close, as the serpent is fabled to keep its sting in its tail. The French excel all other nations in this kind of poetry. Their earliest epigrammatist of any note was Clement Marot (1495–1544); their best are Boileau, Voltaire, and Piron. The epigrams of German writers are for the most part happily expressed moral proverbs but the *Xenien* of Schiller and Goethe contain not a few sharp and biting verses of a satirical character. In Britain, Pope, Burns, Byron, Moore, and other writers have shown a remarkable power of epigrammatic satire.

EPIGRAPH (Gr. *epi*, upon, and *graphe*, I write), a terse inscription placed upon architectural or other monuments, for the purpose of denoting their use or appropriation, and very frequently worked in and forming part of their ornamental details.

EPILEPSY (Gr. *epi*, upon, and *lambanō*, future, *lēpsō*, I seize), a form of disease characterized by sudden insensibility, with convulsive movements of the voluntary muscles, and occasionally arrest of the breathing, owing to spasm of the muscles of respiration, and temporary closure of the glottis (q.v.). E. was called by the ancient Greeks the "sacred disease." Owing to the mysterious and extraordinary character of the convulsion of E., it was always, in ancient times, supposed to be due in a very special manner to the influence of the gods, or of evil spirits; Hippocrates, however, combats this idea in a special treatise, in which he maintains that E. is no more and no less divine than all other diseases. The same idea of the specially supernatural character of E. is shown forth in the deeply rooted oriental notion of demoniac possession. See DEMONIACS. E. is often called, in modern language, the "falling sickness," and this name is not only descriptive of one of its most striking phenomena, but also points distinctly to the most obvious danger of the fit. The patient is seized, without reference to his condition or occupation at the moment, with insensibility, often so complete and sudden as to lead to serious accidents and bodily injuries; in the most aggravated cases, he has no premonitory sensations whatever, but falls down without any attempt to save himself, and usually with a wild inarticulate cry of some kind, immediately after which the face is violently distorted, the head drawn towards one or other shoulder, and the whole body convulsed. These convulsions follow in rapid succession for a few minutes, and are attended by foaming at the mouth, and by great lividity, or, in some cases, livid pallor, which, with the irregular spasmodic movements of the lips, nostrils, and eyes, give a frightfully ghastly expression to the countenance, and almost invariably lead the bystanders to an exaggerated idea of the immediate danger of the fit. The immediate danger is, in reality, not great, excepting that the sudden attack may lead to an injurious or fatal fall; the tongue, however, may be bitten if protruded during the convulsion, or the patient may be so placed as to injure himself seriously by the repeated and unconscious movements of his body, or he may suffocate himself by accidentally falling with his face in water, or otherwise closing up the mouth and nostrils, or by dragging upon a tightened neckcloth. Care should be always taken to avoid these accidents by keeping the epileptic as much as possible within view of persons acquainted with his condition, and able to give such assistance as may be required; as well as by warning the patient himself to avoid all places in which a fall would be especially dangerous. But when an unskilled person happens to witness a fit of E.,

he will do well to remember that beyond the simplest and most obvious precautions against the dangers mentioned above, there is literally nothing to be done; and any attempt to rouse the patient by violent stimuli, as ammonia applied to the nostrils, or by dashing water in the face, or, still more, by administering medicines hastily recommended by the ignorant and thoughtless, is almost certain to do more harm than good. The tongue should be looked to, a piece of cork or other gag being, if necessary, inserted between the teeth; the patient should be then placed on a mattress or other soft place near the ground; his neckcloth should be removed, and the dress loosened round the chest; the head should be, if possible, a little raised, and a free circulation of air maintained (this last precaution being very apt to be neglected in case of a crowd); with these things done, it may be safely affirmed that in the vast majority of epileptic cases nothing has been left undone which will conduce to recovery. The ordinary course of the fit (which usually lasts from five to twenty minutes altogether) is as follows: the convulsions gradually diminish in intensity, and the patient passes into a state of deep but motionless stupor, with dilated pupils, and sometimes, but not always, with snoring or noisy breathing; the foaming at the mouth ceases, the color gradually returns, and this state leads to recovery through a more or less protracted, but apparently natural sleep, the patient, on awaking, being often quite unconscious that he has been the subject of any anxiety, or, indeed, in any unusual condition whatever. Although in all cases of true E. there is a stage of complete coma (q.v.), or unconsciousness, yet the fit is often very transient, and but little attended by convulsion, being also less sudden than above described, and not necessarily causing a fall to the ground; in some cases, also, fits of greater intensity are preceded by certain premonitory symptoms or peculiar sensations, which act as warnings to the patient himself, and lead him to place himself in a position of safety on the approach of the paroxysm. Having in view these distinctions (which are certainly of considerable practical importance), the French language, both popular and scientific, has adopted the terms of *grand mal* and *petit mal* (i.e., great and little evil), as characterizing the more and less dangerous forms of E. respectively. The sensations which precede the fit in some epileptics have been termed in Latin the *aura* (i.e., breath) *epileptica*, from their supposed resemblance to a current of cold air passing over the body, and proceeding from the extremities towards the head. This description does not, however, hold good in all cases; and not unfrequently, as mentioned above, there is no *aura*, or unusual sensation of any kind, preceding the fit. It must be mentioned, however, as bearing on treatment, and as being quite within the bounds of popular medicine, that some of the most ancient authorities assert strongly the power of a tight bandage, placed suddenly upon the limb in which the aura begins, to cut short, or even to prevent altogether, the fit of epilepsy. Although this alleged fact has often been regarded as doubtful, it has never been altogether discredited, and has of late years been brought into renewed notice by good observers. It is even maintained that such a bandage, placed experimentally upon one or other of the limbs, and tightened on the approach of a fit, has been found effective in some cases in which there was no distinctly local sensation; and epileptics have been repeatedly convinced of the propriety of habitually wearing a bandage loosely applied upon the arm, which they have been able, by carefully watching their own sensations, and by being watched in turn by others, to get tightened at the proper time. There is no doubt room for fallacy in these observations, but they may safely be commended to notice, as involving no possible risk of mischief, and as far more worthy of extended trial than the great majority of popular remedies in epilepsy.

But the fit and its treatment form only a part of the anxieties which arise out of a case of epilepsy. The ultimate danger of the disease has little relation to the severity of the individual fits, except in the modified sense explained above; the frequency of the attacks being apparently much more apt to influence the duration of life than their character. Indeed, although epileptics may survive several severe paroxysms at distant intervals, and recover in the end with an apparently unbroken constitution, it rarely happens that very frequently repeated attacks, even of the *petit mal*, are unattended by some permanent depreciation of the powers of mind or of body. The most frequent, perhaps, of all the more serious consequences of confirmed E. is insanity (q.v.), sometimes assuming the form of acute mania or monomania following the attacks, but quite as frequently tending to gradual imbecility without any acute seizure. Sometimes the development of the epileptic insanity, or dementia, is attended by palsy, and other indications of structural disorder of the brain; in other instances, no such consequences occur, and the brain after death may be found to have very little tangible disease, or only such disease as is found in numerous other cases of functional derangement. Very often, even when the mind remains tolerably entire, there is loss of memory, and a certain want of acuteness and depression of spirits, which unfit the individual for the regular business of life. Disorders of the digestion are also not uncommon; and there is frequently a want of tone and vigor in all the bodily functions, which communicates a habitual expression of languor and reserve to the epileptic. Added to this, it can hardly be matter of surprise that the knowledge of his infirmity should deeply influence the mind of the epileptic, and produce a distaste for active occupations, especially for such as expose him to more than ordinary observation.

The causes and the radical cure of epilepsy are almost equally involved in mystery.

It has been supposed by some to be dependent on an increased afflux of blood to the brain; while by other observers and pathological authorities it has been attributed, with about equal force of reasoning, to precisely the opposite condition. Certain cases undoubtedly depend upon organic disease, as tumors or injuries to the brain and its membranes, more especially near the surface. Local sources of irritation in other parts of the body have also been supposed to be exciting causes of E.; and cases are recorded in which the disease has been cured by the amputation of a finger or the division of a nerve. The attention of recent observers has been especially directed to the medulla oblongata and spinal cord (q.v.), as being the most probable physiological seats of a disease so decidedly marked by convulsive movements. But as yet little more than the most vague theoretical inferences can be drawn from their researches as to the cause either of the morbid tendency in E. or of the paroxysm. One of the most curious and suggestive of these recent facts is the experiment of Brown-Sequard, showing that E., or a state closely resembling it, may be induced in certain animals by division of certain portions of the spinal cord, the artificial disease continuing long after the primary effects of the injury have ceased. A still more curious and inexplicable phenomenon has resulted from the multiplication of such experiments; for Brown-Sequard has shown that in Guinea-pigs this artificial E. is sometimes propagated to the offspring, becoming, like the natural disease, a hereditary and congenital morbid tendency. On these strange facts it would be premature to indulge in speculation in this place, but their great importance can hardly be overlooked.

The condition of the epileptic seems to be favorably affected by everything which conduces to a quiet and hopeful state of the mind, and to a vigorous condition of the body. The treatment of the disease should therefore, in general terms, be of the kind termed *tonic* (q.v.), and should be adapted with care, and after very minute and careful inquiry, to the removal of all the special bad habits, and occasional causes of depression, which tend to bring the system into a condition *below par*, in the individual case. The influence of a happy and quiet domestic life, without unhealthy excitement, and with proper occupations, varied by amusement and exercise in the open air, can hardly be overestimated. The marriage of epileptics is, however, not too readily to be sanctioned, as it has been known to be followed, not only by an increase of the disease, but by its transmission to a considerable portion of the family. On the other hand, a too absolute rule on this subject is not without its dangers, and perhaps the practical difficulties of the question are not to be met by any defined or dogmatic expression of opinion, founded on the general pathology of the disease. If the tendency exist, even slightly developed, upon both sides in such a connection, it needs hardly be stated that the dangers of transmission to the descendants is increased in a very great degree. Hence, intermarriages *within epileptic families* must be regarded as always in the highest degree imprudent. Parents and guardians are undoubtedly justified in making this disease an object of special solicitude, and reserve or concealment on this subject on either side, in the case of a proposed marriage, should be regarded as equally dishonorable with any other form of deception in a matter so important to the welfare of society and of the parties concerned.

According to one of the oldest and most respected of American physicians (Dr. Jackson, of Boston), the epileptic tendency may often be successfully treated by the systematic use of an exclusively vegetable diet, or by a very considerable reduction of the proportion of animal food. Among the innumerable remedies recommended by authorities, the salts of iron and zinc have perhaps the largest amount of experience in their favor; and counter-irritants (q.v.) applied to the nape of the neck, or between the shoulders, either by blistering, the use of the seton, or even actual cautery, has been often followed by prolongation of the intervals, or decrease in the severity of the fits. Almost all the accredited remedies, however, have been observed to produce a temporary relief of this kind, even when without any permanent influence on the course of the disease.

Some of the *lower animals* are subject to epileptic fits. The disease is common in dogs and highly-bred pigs. The creatures writhe with involuntary spasms, and are for the time without sight or hearing. Sometimes the muscles of the throat are so involved that fatal suffocation occurs. The attack is generally preceded by dullness, and lasts from ten to thirty minutes. It is generally traceable to torpidity or irregularity of the bowels, worms, debility, or plethora. In dogs, it is a frequent sequel of distemper. In cattle, it usually occurs in connection with the engorgement of the first or third stomachs; they throw themselves violently about, bellowing loudly, but seldom die. It is rare in horses, and differs from megrims, for which it is often mistaken, but in which there are no spasms. The treatment consists in freely opening the bowels, removing worms, if any are present, enjoining bleeding and spare diet, if the patient's condition is high, and generous feeding and tonics where it is low. The best preventives are carefully regulated diet, an occasional laxative, with a course of tonics, and especially of arsenic.

EPILO'BIUM, a genus of plants of the natural order *onagraceæ*, having four deciduous calycine segments; four petals; a much elongated, 4-sided, 4-celled, 4-valved, many-seeded capsule; and seeds tufted with hairs at one end. The species are herbaceous

perennials, natives of temperate and cold countries, and very widely diffused both in the northern and in the southern hemisphere. Some of them are very ornamental, from the beauty of their flowers. Most of the British species have small flowers, and some of them are very common in moist places. *E. angustifolium*, which differs from all the other British species in having the petals dissimilar in shape and size, is frequently planted in gardens and shrubberies, on account of its numerous and beautiful rose-colored flowers; but its creeping roots are apt to overrun a flower-garden. It is sometimes called FRENCH WILLOW, from the resemblance of its stems and leaves to some kinds of willow, and the name WILLOW-HERB is often extended to the whole genus. It is found in very northern regions, and its leaves and young shoots are sometimes a grateful addition to the meals of the arctic traveler, although not likely to be relished in almost any other circumstances. The pith, when dried, yields a quantity of sugar to boiling water, and is used in Kamtchatka for making a kind of ale, from which also vinegar is made.

EPILOGUE (Gr. *epi*, upon or after, and *logos*, a speech) means, in oratory, the summing up or conclusion of a discourse; but, in connection with the drama, it denotes the short speech in prose or verse which frequently, in former times, was subjoined to plays, especially to comedies. The E. was always merry and familiar in its tone, and was intended to establish a kindly understanding between the actor and the audience, as well as to conciliate the latter for the faults of the play, if there were any, and to send them away in good humor. One of the neatest and prettiest epilogues ever written, and one which completely realizes what an E. should be, is that spoken by Rosalind at the conclusion of Shakespeare's *As You Like It*.

EPIM'ACHUS, a genus of birds of Australia and Papua, not unlike the bird of paradise; in color, violet black or black brown, with a collar of feathers margined with green at the base of the neck. The tail feathers consist of about 12 long plumes ending in thread-like points. The head and breast are brilliant blue.

EPIMEN'IDES, a Greek poet and priest, b. probably at Phæstus in Crete, in the 6th or 7th c. B.C., and lived at Cnossus. His history has only reached us in a mythical form. He is said to have fallen asleep in a cave when a boy, and not to have wakened for 57 years. Like Rip Van Winkle, he was naturally much astonished and perplexed on his return to broad daylight. His period of slumber, however, had not passed away unprofitably. His soul, disengaging itself from its fleshly prison, betook itself in the interval to the study of medicine and natural philosophy; and when it had shuffled on again its mortal coil, E. found himself a man of great knowledge and wisdom. Goethe has written a poem on the subject, *Des Epimenides Erwachen*. E. went to Athens about 596 B.C., where, by the performance of various mystical rites and sacrifices, he stayed a plague with which the inhabitants were afflicted. When he died is not known, but we may be certain that he did not live (as is fabled) for 299 years. That he wrote the epic poems attributed to him, the longest of which was on the Argonautic expedition, is considered highly improbable. Compare Heinrich, *E. aus Kreta* (1801).

EPINAL, a t. of France, in the department of Vosges, is situated in a delightful district at the western base of the Vosges mountains, on both banks of the Moselle, about 200 m. e.s.e. of Paris. Lat. 48° 10′ n., long. 6° 26′ east. It is a well-built, handsome town, with clean, regular, though badly-paved streets, and is surmounted by the ruins of an old castle, the gardens attached to which are much admired. Among its chief buildings are the parish church, an antique Gothic structure; the hospital, formerly a capuchin convent; a museum of pictures, antiquities, and natural history; the barracks; and the residence of the prefect of the department. E. manufactures chemical products, lace, block-tin, wrought-iron, pottery, cutlery, paper, and leather, and has some trade in grain, wine, timber, etc. Pop. '76, 13,827.

ÉPINAY, LOUISE FLORENCE PÉTRONILLE DE LA LIVE D', a French writer, b. about the year 1725. At the age of 19, she married her cousin, M. d'Epinay, but the union did not prove a happy one. While her husband was abandoning himself to dissolute courses, she sought the intercourse of philosophers and men of genius. In 1745, she formed a close intimacy with Rousseau, and presented him with a small house (the now famous Hermitage) which stood on one of her husband's estates in the woods of Montmorency. An unfortunate jealousy, however, which Rousseau conceived for Grimm, another friend of Mme. d'E., was followed by an open rupture with his benefactress, and in his *Confessions* he scrupled not to malign her by way of vengeance. She spent the remaining 25 years of her life in comparative solitude, seeing only a small and select circle of philosophers and littérateurs. When Grimm was obliged to leave Paris, she continued, under the direction of Diderot, his literary correspondence with northern sovereigns. She died in 1783. From the pen of Mme. d'E. we have *Conversations d'Emilie* (Paris, 1774), a work on education pronounced by the French academy to be the most useful that had been published for a number of years; *Mémoires et Correspondance de Madame d'Epinay, renfermant un Grand Nombre de Lettres inédites de Grimm, de Diderot et de J. J. Rousseau, etc.* (Paris, 1818); *Les Confessions du Comte de****; etc.

EPIPHA'NIUS, SAINT, a Christian bishop, and writer of the 4th c., was b. of Jewish parents in Palestine. He was baptized in his 16th year, and was educated among the Egyptian monks, who inspired him with an aversion to all liberal science. He rose

gradually to the rank of bishop of Constantia (formerly Salamis) in Cyprus, and continued in that office from 367 till his death in 403. His polemical zeal was conspicuously manifested against Origen. He had proclaimed him a heretic in his writings, and in 394 he went to Palestine, the focus of Origen's adherents, and called upon John, bishop of Jerusalem, and the two monks, Rufinus and Jerome, to condemn him. A more legitimate object of his violent opposition was the increasing worship of images. Jerome relates how he indignantly tore down an image in the precincts of a church in Palestine, as being contrary to the divine law. Among his writings, collected by Petavius (2 vols., Paris, 1622), the most important is his *Panarion*, or catalogue of all heresies (80 in number), a work which strikingly shows his unfitness for being a historian. His credulity and want of honesty are excessive.

EPIPH'ANY (Gr. *Epiphaneia*, appearance), denoted, among the heathen Greeks, a festival held in commemoration of the appearance of a god in any particular place. The word subsequently passed into the usage of the Christian church, and was used to designate the manifestation or appearance of Christ upon the earth to the Gentiles, with especial reference to the day on which he was seen and worshiped by the wise men who came from the east. This occasion is commemorated in the church on the 6th of Jan., the 12th day after Christmas, and hence the E. is also called twelfth day. The E., which is said not to have been observed as a separate festival, but to have been included in the feast of the nativity till 813, is observed as a "scarlet day" at Oxford and Cambridge.

EPIPHE'GUS, a parasitic herb growing from the roots of the beech tree, and seeming to grow from the ground independently. It is 6 to 12 in. high, purple or yellow-brown, slender, with scales instead of leaves. In Virginia it is called "cancer-root," and has the reputation of being a specific for that disease.

EP'IPHYTES (Gr. *epi*, upon, *phyton*, a plant), often and popularly, but less correctly, called air-plants, are plants which are not rooted in the ground, but are attached to trees, from the decaying portions of the bark of which, or of mosses and lichens which grow upon it, they derive their nutriment, probably, also, depending upon the air for it to a larger extent than other plants do. Mosses and lichens, themselves, growing upon trees, may be called E., but the term is generally used of phanerogamous plants. E. are not connected with the trees upon which they grow in the peculiar manner of the mistletoe, *balanophora*, and other true parasites—not sending roots like them into the wood to suck the juice of the tree. It is chiefly in warm climates that phanerogamous E. are found and in those which are also moist. Most of them prefer shady situations. Within the tropics, they often form an interesting and remarkable feature of the vegetation. Some of the *bromeliaceæ* (as *tillandsia*), *cactaceæ*, *araceæ*, *gesneraceæ*, and other natural orders are E.; but the order to which they belong more than to any other is *orchidaceæ*. Many of the epiphytous orchids, as well as other E., are remarkable for their beauty; and the attention which has recently been given to their cultivation in hothouses has been rewarded by the most perfect success. See ORCHIDS. Plants which usually occur as E. are sometimes also found growing on rocks. Although seldom found except in moist climates, E. are generally capable of enduring a considerable amount of drought, parting slowly with the moisture which they have once imbibed.

EPI'RUS, the ancient name of a part of Greece, bounded on the e. by the chain of Pindus, on the s. by the Ambracian gulf, on the w. by the Ionian sea, and on the n. by Illyria and Macedonia. It formed the southern part of modern Albania, or the pashalic of Janina, a wild and mountainous region, the haunt of robbers and semi-civilized tribes in all ages. The chief town was Dodona (q.v.); the chief rivers, the Acheron, Cocytus, Arachthus, and Charadrus. Anciently, it was celebrated for its cattle and its breed of Molossian dogs. Its earliest inhabitants were probably Pelasgians. In the historic period, Theopompus speaks of fourteen tribes, most of whom were believed by the Greeks themselves to be not of Hellenic origin. The principal were the Chaones, Threspoti, and Molossi, the last of whom finally obtained the entire sovereignty of the country. Of the Molossian kings of E., the most distinguished was Pyrrhus, who long waged successful war against the Romans. But after this race of kings became extinct (239–229 B.C.) by the death of Ptolemy, grandson of Pyrrhus, a republican constitution was adopted, whereupon parties sprang up among them, and the neighboring Macedonians got the upper hand. On the conquest of Macedonia by the Romans (168 B.C.), the Epirots were accused of having assisted Perseus, the Macedonian king, and the most revengeful measures were put in force against them. Æmilius Paulus, the Roman gen., plundered and razed to the ground the 70 towns of E., and sold into slavery 150,000 of the inhabitants. From this period, E. shared the vicissitudes of the Roman and Byzantine empires, until 1204, when one of the Comneni made himself independent. His dynasty ruled the country until 1466, when it was finally conquered by the Turks (see SCANDERBEG). E., peopled largely since the 14th c. by Albanians (see ALBANIA), formed latterly a part of the Turkish vilayet of Janina. The Berlin congress of 1878 recommended that the southern part of E. should be ceded to Greece.

EPIS'COPACY (Gr. *episcopos*, bishop or overseer) is that form of church government in which one order of the clergy is superior to another—namely, bishops or prelates to

priests or presbyters, the ordinary ministers of parishes or congregations. It is sometimes called *diocesan episcopacy*, to distinguish it from that *episcopacy* which Presbyterians and Independents also assert—the oversight of flocks by their pastors. See BISHOP. It is not essential to E. that there should be *archbishops*, exalted in rank and authority above other bishops, although of the same order: and in some Episcopalian churches there are none.

E. has actually subsisted under very various modifications; the power of bishops being more or less absolute, or more or less controlled by synods of presbyters, or even —in the Protestant Episcopal church of the United States—by a diocesan convention, composed both of presbyters and lay delegates. The power of the bishop is also variously affected by the relations subsisting between church and state; and great differences exist in this respect between the church of England, the church of Sweden, and the church of Denmark, all Episcopalian, and all connected with the state as *established* churches.

The church of Rome, the Greek church, and other branches of the eastern church, are Episcopalian. Of Episcopalian Protestant churches not established, the most important are that in the United States, that in Scotland, and the Moravian church. See ANGLO-CATHOLIC CHURCH; and ENGLAND, CHURCH OF.

EPISCOPACY. 1. After much discussion, standard writers on both sides of the question now admit that the term "episcopos," when it appears as a term of office in the New Testament, is synonymous with "presbyter," the same officers of the church being called by both names—the one with reference to their duties, and the other to their age. The "presbyters" or elders of the Ephesian church were called by Paul "bishops" or overseers of the flock. In the pastoral epistles, both words are used interchangeably. Peter, exhorting the "presbyters" as their brother "presbyter," speaks of their office as that of an overseer or "bishop." 2. In each church of the new testament there seems to have been, at first, a plurality of presbyters or bishops. In the church of Ephesus (as has just been said), there were presbyters who were bishops. In the church at Philippi, there were bishops as well as deacons. Paul and Barnabas, in their journey, ordained presbyters in every church. 3. In each church, it may be taken for granted that some one of the officers was chosen to preside. This choice, the advocates of prelacy affirm, was made at first by apostolic authority or in imitation of apostolic example. Presbyterian and Congregational writers, on the other hand, regard it as only a wise human arrangement similar to that which convenience and order suggest in all associations of men. 4. Gradually the two synonymous names of office were divided; "bishop" being restricted to the president, and "presbyters" continued to the rest. This division, the prelatical theory of church government asserts, was made by apostolic agency in the accomplishment of a divine intention that the bishop, as a successor of the apostles, should be vested with authority over the presbyters and the church. The non-prelatical theory, on the contrary, affirming that the apostles, as such, had no successors, maintains that the division of title and of function was made without apostolic agency and contrary to the spirit of the Savior's command: that it was a result of the innate tendency in human nature to exercise and to yield authority, greatly stimulated and aided by imitation of the absolute control exercised by the civil government. 5. Even after this change had taken place, the episcopal office was regarded, theoretically, as possessing equal authority and honor. But gradations of rank began at once, practically, to arise similar to the gradations in civil government throughout the Roman empire. Bishops in the country and in the smaller towns or villages became subordinate to the bishop of the adjacent city. 6. As the chief city of each district had the civil rank of a "metropolis" or mother city, so the bishop of that city, styled metropolitan from his position, took the lead in the deliberations of the local synod as "*primus inter pares*," and acted as the representative of his brother bishops in their intercourse with other churches. Thus, though all bishops were nominally equal, a superior dignity and authority came by general consent to be vested in the metropolitans. 7. A still higher dignity was assigned to the bishops of the chief seats of government—Rome, Alexandria, and Antioch; and among these the bishop of Rome, the capital of the empire, had precedence. 8. Convenience dictated that the ecclesiastical divisions should follow the civil divisions of the empire. Roman emperors saw with amazement Christianity copying their jurisdiction in every part of the land. As the struggle deepened, the Christian bishop and the Roman governor became two rival authorities, the representatives of warring kingdoms within the same domain. When Christianity, instead of being destroyed, became the established religion, and the two administrations were made one, the resemblance between them was perfected, and the gradations of ecclesiastical rank which had grown up by custom were ordained by law. The empire was divided, as to its secular government, into four prefectures; these were subdivided into dioceses, and the dioceses into provinces. The rulers of cities and districts were subject to the governor of their province; the governors of provinces to the governor of their diocese; the governors of dioceses to their prefect; and the prefects to the emperor. In like manner, the bishops of cities and districts were subjected to the metropolitan of their province: the metropolitans of the provinces to the metropolitan of their diocese; the metropolitans of the dioceses to the patriarch

of one of the chief cities (of which there were now four), Rome, Constantinople, Alexandria, and Antioch; and the patriarchs of these cities, like the prefects, had, at first, no superior except the emperor. 9. Theoretically, all these primatial sees were co-ordinate in authority and mutually independent. But by degrees the bishops of the more important cities overshadowed their brethren, and exercised a supremacy which, though due rather to custom than to recognized claims, was increasingly acquiesced in from the manifest advantage of having a strong central power which could interfere in theological controversies or ecclesiastical disputes with an authority to which all would bow. 10. As the cities, Rome and Constantinople were both capitals of the empire, so their bishops were exalted above all others. And as these two cities became rivals for the supreme place, so the two bishops contended with each other for the first place as universal bishop. 11. At length the western and eastern churches were torn asunder. With the decline of the empire, the grandeur of the eastern church was obscured, until both empire and church were overwhelmed by the Ottoman power and the Mohammedan faith. With the rise of new kingdoms and the conversion of new nations in the west, the bishop of Rome was lifted up as "the head of the universal church."

EPISCOPAL CHURCH, PROTESTANT, is the title of that portion of the Christian church in the United States which, before the revolution, was a part of the church of England. Its history is naturally divided into two periods. I. *During colonial times.* The settlement of Jamestown was commenced in 1607. Its charter required that the true word and service of God should be preached, planted, and used according to the rules and doctrine of the church of England, not only in the colonies, but also, as far as possible, among the savages around them. Rev. R. Hunt labored in his vocation with piety and zeal to the end of his life. After him, Rev. A. Whittaker acquired, by his devoted exertions, the title, "Apostle of Virginia." Under his instrumentality Pocahontas was converted and baptized. As the first colonists in Virginia were all members of the church of England, provision was made for ministerial support by allowing 1500 lbs. of tobacco and 16 barrels of flour, per annum, to each minister, and by setting apart in each new borough a portion of land for a glebe. Tithes were subsequently introduced. None but ministers who had received episcopal ordination could legally officiate in the colony. The officers and agents of the company, in their efforts to promote morality and religion, were exhorted "to employ their utmost care to advance all things appertaining to the order and administration of divine service according to the form and discipline of the church of England, carefully avoiding all factious and needless novelties, which only tend to the disturbance of peace and unity." As an endowment for a college, 10,000 acres of land were given and a large amount of money was collected. Great zeal in behalf of the conversion and education of the Indians was felt, and a strong hope was cherished that the contemplated institution would be very useful to them. But, in 1622, they conspired against the English and murdered many of them. This embittered the minds of the survivors, and arrested all plans for their advancement in education and religion. During the next half century, owing to political disturbances and other causes, religion greatly declined throughout the colony, so that in 50 parishes nearly all were destitute of glebe, parsonage, church, and minister. In 1685, Rev. James Blair came as missionary to Virginia, and having been appointed commissary to the bishop of London, exerted, during an administration of more than 50 years, a very great influence in restoring and enlarging the work of the Episcopal church. By his efforts the college of William and Mary was founded in 1692. The colony of Maryland, founded in 1633 by lord Baltimore, a Roman Catholic, with 200 families and several priests, offered free admission "to every person professing to believe in Jesus Christ." At lord Baltimore's death, in 1676, there were 10 counties and 16,000 inhabitants, the majority of whom were Protestants. On the accession of William of Orange, "a Protestant revolution" took place, and a royal governor was sent into the colony. In 1692, the church of England was established by law, the province was divided into 30 parishes, and tithes for the support of the Episcopal ministers were imposed on every inhabitant, no matter what were his religious preferences and creed. Dr. Thomas Bray was appointed commissary of the bishop of London for the province of Maryland. By his efforts before leaving England, the societies "for promoting Christian knowledge," and "for the propagation of the gospel in foreign parts," were established. After his arrival in Maryland he entered with zeal into his work, and was active in having a bill passed, in which it was provided, "that the Book of Common Prayer and administration of the sacraments, with the rites and ceremonies of the church according to the use of the church of England, the psalter, and psalms of David, therein contained, be solemnly read by all and every minister or reader in every church, or other place of public worship, within this province." Dr. Bray's actual residence in Maryland was soon interrupted, but his zeal in behalf of the church of England, as established therein, continued to the close of his life. At this date a majority of the inhabitants are reported as in communion with that branch of the church.—In the colonies of Carolina and Georgia Episcopal churches were planted and continued to flourish. New York was first colonized by the Dutch in 1615, and, in its religious opinions and forms, was Presbyterian. In 1664, it was seized by the English. After this, precedence was given to the church of England, and a tax levied for its

maintenance. Trinity church, New York city, was founded in 1696; its first rector, Rev. W. Vesey, was also for half a century commissary of the bishop of London. This corporation is now celebrated for its great wealth. In New Jersey the early settlers were principally Quakers, Presbyterians, and Congregationalists; but all other Christians enjoyed entire religious liberty. Missionaries of the society for propagating the gospel worked earnestly and with good effect in the establishment of Episcopal churches. In Pennsylvania the first church of this order was Christ's church, Philadelphia, founded in 1695; and at various other points missionaries of the English society engaged in successful work. The first colonies of New England, composed chiefly of English Puritans and Separatists, who came to America mainly to escape the restrictions and oppressions to which they had been subjected by church laws at home, sought to exclude episcopacy. Because of the severe measures adopted for this purpose, and from other causes, for 60 years after the landing of the pilgrims there were no Episcopal churches in New England. In 1679, Charles II., on the earnest representation of some of the inhabitants, had one built in Boston. From that time, through the efforts of the English missionary society, some progress was made. Missionaries were sent to various points, who were honest, faithful, and laborious in traveling and preaching the gospel. If the church of England had appointed bishops for the colonies, the growth of the denomination therein would doubtless have been greater and more rapid. II. *After the attainment of national independence.* At the beginning of the revolution there were in the middle and eastern states about 80 Episcopal ministers, many of whom had received a large part of their support from the English society. After the war, aid from that source was, of course, withdrawn. Many of the ministers and people had adhered to the crown during the struggle, and at its close left the country. Soon after, the landed endowments of the church of England in Virginia were lost, and Episcopalians were thrown on their own resources. They were poor, and their prospects were not bright. Two things were necessary—to secure union among the churches of the several states, and to obtain bishops. The first was accomplished by the formation of the general convention, which has ever since been accepted as the governing body of the Episcopal church in the United States. The first American consecrated to the episcopal office was bishop Seabury, who, about 1785, obtained consecration from Scottish bishops. In 1789, William White and Samuel Provoost were consecrated, by the archbishop of Canterbury and other English bishops, as bishops of Pennsylvania and New York; and, in 1790, James Madison was consecrated, also by English bishops, as bishop of Virginia. In arranging the order of common prayer the English prayer-book was retained, with such alterations as the political changes had made necessary, and with some other modifications. It came into immediate use, and has since been maintained without material alteration. The Episcopal church having thus early organized itself in accordance with the new life of the country, soon began to increase. It is now strong in large cities and flourishing towns; has many adherents among persons of wealth and culture; and, aided by its complete and zealous organization of the church as a missionary society, not only continues to increase in the older states, but also extends its churches and dioceses over all parts of the land. It is steadily subdividing its dioceses, and is considering the expediency of arranging them all, according to geographical position, into four provinces, to be united under a council that shall meet once in a fixed term of years. The doctrine of the American Episcopal church is that of the church of England, "which while it receives the Holy Scriptures as the ultimate rule of faith, does not throw them open to the varying interpretations of every man's private judgment, but explains them by the creeds, by definitions of Christian doctrine made by the general councils, and by the aid of traditions which it believes to have come down through an unbroken line of teachers from the apostles themselves." The growth of this church during the present century is shown in the following table:

Years.	Number of Dioceses.	Bishops.	Presbyters and Deacons.	Total.
1820	15	9	301	310
1830	20	11	514	525
1840	27	19	1,040	1,059
1850	29	32	1,557	1,589
1860	33	43	2,113	2,156
1870	39	52	2,786	2,838
1879	48	61	3,314	3,375

The following statistical summary, taken from the *Church Almanac* for 1880, gives the figures for 1879 so far as reported:

Dioceses	48
Missionary districts (including Africa, China, and Japan)	13
Bishops	61
Priests and deacons	3,314
Whole number of clergy	3,375

Parishes, about							2,900
Ordinations (in 32 dioceses and 2 miss. districts)							180
Candidates for deacon's orders (in 34 dioceses and 4 miss. districts)							303
Baptisms	(" 42	"	" 8	"	"	)	40,296
Confirmations	(" 43	"	" 8	"	"	)	24,652
Communicants	(" 48	"	" 10	"	"	)	322,713
Sunday-school teachers	(" 41	"	" 5	"	"	)	27,547
Sunday-school scholars	(" 42	"	" 8	"	"	)	253,137
Contributions	(" 40	"	" 8	"	"	)	$6,068,272

EPISCOPAL SYSTEM, in the Roman Catholic church, is the name given to the theory which vests the supreme ecclesiastical power in the whole body of bishops. It was urged most powerfully in the conflicting papal elections which occurred during the 14th century. All who adopted it declared that the general councils of the church were above the pope. Among this class the university of Paris and the Gallican church were conspicuous. The theory continued to spread, also, in Germany, where Nikolaus von Hontheim, co-adjutant bishop of Treves, was one of its chief supporters, and, in 1763, wrote his celebrated book concerning it. In 1785, the archbishops of Treves, Mayence, Cologne, and Salzburg, agreed in demanding from the pope the restoration of the episcopal privileges which had formerly been vested in the German archbishops. But the declaration of the infallibility of the pope by the Vatican council has put an end to all debate on the subject, and, for the present at least, made the episcopal system impossible in the Latin church.

EPISCO'PIUS, SIMON (whose Dutch name was Bisschop), the head of the Arminian party after the death of Arminius, was b. at Amsterdam in 1583, studied at Leyden, took his degree in 1606, and was ordained pastor of the village of Bleyswyck near Rotterdam in 1610. In the following year, the states-general, with the intention of putting an end to the agitations created by the controversies between the Gomarists or Calvinistic party and the Arminians or Remonstrants, ordered a conference to be held in their presence at the Hague between six ministers of each party. E. was one of the six charged with the advocacy of Arminianism, and highly distinguished himself by his good temper, ability, and learning. In 1612, the curators of the university of Leyden appointed him professor of theology in the room of Gomar, who had gone to Seeland. This enraged the leaders of the orthodox party, who unscrupulously accused him of Socinianism, and of having entered into an alliance with the Roman Catholics for the destruction of Protestantism. By this means the fanaticism of the populace was roused against him; he was insulted and abused in the street, and on one occasion narrowly escaped being stoned to death. The house of his brother in Amsterdam was also sacked, under the pretext that it was a rendezvous of the Remonstrants. In 1618, occurred the famous synod of Dort (q. v.). E. was present, along with several other Arminians. The Calvinists, who happened to be in an overwhelming majority, would not allow him to speak; they told him that the synod was met not to discuss, but to judge; and, in fact, the whole proceedings exhibited as revolting a specimen of high-handed tyranny as any on record, even among ecclesiastical tribunals. Expelled from the church, and banished from the country, E. betook himself first to Antwerp, and afterwards to Rouen and Paris, but in 1626 returned to Rotterdam, where the *odium theologicum* against his party had become less virulent. Here he married in 1630, and four years after was made primarius professor of divinity in the newly-established college of the Remonstrants. He died in 1643. E. held enlightened principles in regard to religious toleration. Not placing a high value on merely doctrinal views, but rather believing in the efficacy of the Christian spirit to elevate and purify the character, and seeing, moreover, the presence of this spirit in men holding the most conflicting opinions (when not inflamed with controversial hates), he would have wished a broader and more Catholic bond of unity among Christians than the opinionative creeds of his day permitted. His chief works are his *Confessio Remonstrantium* (1621); *Apologia pro Confessione* (1629); and *Institutiones Theologicæ*, incomplete. A complete edition of his works appeared at Amsterdam in 2 vols., 1650.

EPIS'TATES, the title of the presiding officers of the great councils of the Athenians, the Ecclesia and the council of Five Hundred. The E. held office for only one day at a time.

EPISTLE. The lesson in the church service called the E., derives its name from being most frequently taken from the apostolic epistles, although it is sometimes also taken from other parts of Scripture. This part of the service is believed to be as old as the 6th century.

EPISTLE SIDE OF THE ALTAR, the left side of the altar or communion table, looking from it, at which in the church service the epistle of the day is read. It is of lesser distinction than the right or gospel side, and is occupied by the clergyman of lower ecclesiastical rank. The reader of the epistle was in former times called the epistler.

EPISTLES, SPURIOUS, have been forged by various unknown authors, and for a variety of purposes. Many of them are lost, but a considerable number are extant, among which are the following: 1. *The Epistle of Paul to the Laodiceans.*—In the early

part of the 2d c. there was a Greek epistle with this title. It was received by the heretic Marcion, but is generally believed to have been a forgery founded on Paul's direction to the Colossians to read the epistle from Laodicea. "Some," said Theodoret in the 5th c., "imagine Paul to have written to the Laodiceans, and accordingly produce a certain forged epistle; but the apostle does not say *to*, but *from*, the Laodiceans." There is also an epistle with this title now extant in Latin, which, however, cannot be proved to be a translation of the former, but has, probably, a comparatively modern origin. It was first published in 1517, but existed in manuscript, at an earlier date, in the library of the Sorbonne. 2. *The Third Epistle of Paul to the Corinthians.*—Many persons have inferred from several passages in the two genuine epistles that Paul wrote a third which is not in the canon. There is still extant in the Armenian language an epistle professedly from the Corinthians to the apostle, with his reply. It was quoted in the 3d c. by Gregory, the illuminator, first bishop of Armenia, but has not been noticed by any ancient Greek or Latin writer. 3. *The Epistle of Peter to James* was forged in very early times, and is supposed to have been used as an introduction to the *Preaching of Peter*, which was held in great esteem by some early Christian writers, and was considered a genuine work by Clement of Alexandria (about the end of the 2d c.), Theodotus of Byzantium, and others. It was used by the heretic Heracleon in the 2d century. Origen (first half of 3d c.) did not receive it as the work either of Peter or of any other inspired person. Its author, perhaps, was one of the Ebionites at the opening of the 2d century. 4. *The Epistles of Paul and Seneca* comprise eight long letters in Latin from the philosopher Seneca to the apostle Paul, and six from Paul to Seneca in reply. They are certainly ancient. Jerome (about the end of the 4th c.), supposing them genuine, valued them highly, and was led by them to place Seneca in his catalogue of saints. At that time they were read by many. Augustine (about the same time) also speaks of them as genuine. Some learned men of more modern times accept them, but by far the greater number pronounce them spurious. 5. *The Epistle of Publius Lentulus*, written from Jerusalem to the Roman senate. It contains (but with many variations of the text) the following oft-quoted description of the personal appearance of Christ: "A man of tall stature, good appearance, and a venerable countenance, such as to inspire beholders with both love and awe. His hair, worn in a circular form and curled, rather dark and shining, flowing over the shoulders, and parted in the middle of the head, after the style of the Nazarenes. His forehead smooth and perfectly serene, with a face free from wrinkle or spot, and beautified with a moderate ruddiness, and a faultless nose and mouth. His beard full, of an auburn color, like his hair, not long but parted. His eyes quick and clear. His aspect terrible in rebuke, placid and amiable in admonition, cheerful, without losing its gravity: a person never seen to laugh, but often to weep." Dr. Edward Robinson, after a careful examination of the whole subject, comes to the following judgment: "*In favor* of the authenticity of the letter we have only the purport of the inscription. There is no external evidence whatever. *Against* its authenticity we have the great discrepancies and contradictions of the inscription; the fact that no such official person as Lentulus existed at the time specified, nor for many years before and after; the utter silence of history in respect to the existence of such a letter; the foreign and later idioms of its style; the contradiction in which the contents of the epistle stand with established historical facts; and the probability of its having been produced at some time not earlier than the 11th century." 6. *An Epistle of the Virgin Mary*, said to have been written in Hebrew, but extant in Latin, addressed to the Christians of Messina, and giving name to the metropolitan church of "Our Lady of the Letter." 7. *An Epistle of the Virgin* to the Florentines. 8. *From the same* to Ignatius, with his reply. Numerous other spurious epistles need not be noticed here.

EPISTOLÆ OBSCURORUM VIRORUM (Lat. Letters of Obscure Men) is the title of a collection of satirical letters which appeared at the commencement of the 16th c., and professed to be the composition of certain ecclesiastics and professors in Cologne and other places in Rhenish Germany. They were directed against the scholastics and monks, and lashed with merciless severity their doctrines, writings, morals, modes of speech, manner of life, follies and extravagances, and thus helped in no small degree to bring about the reformation. The controversy of Reuchlin with the baptized Jew, Pfefferkorn, concerning Hebrew punctuation, gave the first occasion to the *Epistolæ*, and it is probable that their title itself was suggested by the *Epistolæ Clarorum Virorum ad Reuchlinum Phorcensum* (1514). They were addressed to Ortuin Gratius in Deventer, who was by no means so complete an ignoramus as might be supposed from this circumstance, but who had made himself odious to the liberal minds of the time by his arrogant pretension and his determined hostility to the spirit of his age. On the first appearance of the work, it was fathered on Reuchlin; afterwards, it was ascribed to Reuchlin, Erasmus, and Hutten. More recent investigators have inclined to the belief, that the *first* part, which appeared at Hagenau in 1515 (but professedly at Venice), was the production of Wolfgang Angst, a learned and witty book-printer of that town; but, latterly, doubt has also been expressed whether even he had anything to do with the *Epistolæ*. In the composition of the second part (published in 1519), after Ulrich von Hutten, Erotus Rubeanus had the most considerable share. The circumstance of the *Epistolæ* being placed in the catalogue of forbidden books by a papal bull, helped to spread it not a

little. Among the numerous editions of the work (1643, 1703, 1827, etc.), the best is that by Böcking (1858; 2d ed. 1864). See D. F. Strauss's *Ulrich von Hutten.*

EP'ITAPH (Gr. *epi*, upon, and *taphos*, a hillock, mound, or other monument placed over a grave). From originally signifying a monument, this word is now used exclusively to designate the inscription commemorative of the deceased which is placed upon the monument. This perversion may in some measure have arisen from the remembrance of the funeral orations which the ancients were in the habit of pronouncing at funerals. But the E., in its stricter sense, was well known to the classical nations of antiquity; and, indeed, by every people a brief commemoration of the heroic actions or personal virtues of their illustrious dead has been regarded as one of the worthiest occupations of the faculties of the living. As epitaphs were not only engraved on the most enduring substances, but from their brevity were easily preserved in the memory and orally transmitted, wherever we find the literature of a people at all we are pretty sure to discover specimens of their epitaphs. Pettigrew has translated several from Egyptian sarcophagi (Bohn's edition, p. 5), but they are of no great interest. Herodotus (vii. 228) has preserved to us those which the Amphictyons caused to be inscribed on the columns which they raised in honor of the heroes of Thermopylæ, and that which Simonides, from personal friendship, placed on the tomb of the prophet Megistias. The general inscription for the whole of them was to this effect: "Four thousand from Peloponnesus once fought on this spot with three hundred myriads;" and that which was special to the Spartans was still more memorable: "Stranger, go tell the Lacedemonians that we lie here obedient to their commands." The *Anthologia Græca*, edited by Brunk, and subsequently by Jacobs, contains the largest collection of Greek epitaphs: of these many were translated and published by Bohn in 1854, under the editorial care of Mr. George Burges. Of Roman epitaphs, every antiquarian museum even in this country presents numerous examples; for the form in which they were conceived was adopted by our own Romanized forefathers, and many a stone bearing the well-known *D. M.* (*Diis Manibus*), or *Siste Viator*, probably covered the remains of those whose veins never contained a drop of Roman blood. A very interesting collection of early Christian epitaphs will be found in Dr. Charles Maitland's *Church in the Catacombs*, published in 1846. The naturally epigrammatic turn of the French mind peculiarly adapts it for this species of composition, and in French collections, such as the *Recueil d'Epitaphes*, very felicitous examples are to be found both in Latin and in French. Of the former may be mentioned the "Tandem felix!" which the count de Tenia, who had enjoyed every form of temporal prosperity, caused to be engraved on his tomb; and of the latter, the touching E. to a mother, "La première au rendez-vous." A large portion of the earlier monuments, and consequently of the epitaphs of this country, were destroyed at the reformation, and subsequently by the inconoclastic rage of the Puritans and Presbyterians. But when we come down to a later date, the literature of no people, either ancient or modern, can vie with our own in this peculiar branch, for whilst English epitaphs possess the point and terseness without which no E. can be successful, they exhibit a feature almost unknown in those of other nations—that, viz., of wit, or more properly speaking, perhaps, of humor. It seems as if the wittiest people in the world, as the English unquestionably are, had found it impossible to confine their raillery to the living, and accordingly we find that the harmless peculiarities of the dead have often been hit off on a tombstone, with a felicity which has rendered immortal what otherwise the next generation must have forgotten. Of this class of epitaphs our collections present an almost infinite variety. There are many excellent old collections of epitaphs, such as the *Thesaurus Epitaphiorum* of Philip Labbe, Paris, 1666. Of modern ones, the best is that of Pettigrew, published by Bohn, which is so arranged as to mark the diversity of taste prevailing at different periods of our history. See also the works of Gruter, Græsius, Reinesius, Muratori, Mazochius; the *Monumenta Anglicana*, London, 1719; Weaver's *Ancient Funeral Monuments*, etc.

EPITHALA'MIUM was a species of poem which it was the custom among the Greeks and Romans to sing in chorus near the bridal-chamber (*thalamus*) of a newly-married couple. Anacreon, Stesichorus, and Pindar composed poems of this kind, but only scanty fragments have been preserved. The epithalamium of Peleus and Thetis by Catullus is one of the finest specimens of Latin poetry extant; but probably the most gorgeous epithalamium in all literature, is that of the English poet Spenser. A collection of Greek and Latin epithalamia is to be found in Wernsdorf's *Poetæ Latini Minores* (4th vol., part 2).

EPITHELIO'MA, a variety of cancer, attacking surfaces covered with epithelium or epidermis. See CANCER.

EPITHE'LIUM is the term applied in anatomy to the cell-tissues which, in layers of various thickness, invests not only the outer surface of the body, and the mucous membranes connected with it—as, for example, those of the nose, lungs, intestinal canal, etc.—but also the closed cavities of the body, such as the great serous membranes, the ventricles of the brain, the synovial membranes of joints, the interior of the heart and of the blood-vessels proceeding to and from it, the ducts of glands, etc.

The thickness of this tissue varies extremely with the position in which it occurs. In some parts it consists of numerous strata of cells, collectively forming a layer of more

than a line in thickness; in other parts, it is composed of only a few strata, or often of only a single stratum of cells, and can only be detected by the microscope.

The cells of which the E. is composed are usually soft nucleated cells; they may be rounded, polygonal, fusiform, cylindrical, or conical in shape, and sometimes they possess vibratile cilia, the appearance and uses of which will presently be explained.

In his *Manual of Human Histology*, Kölliker adopts the following arrangement. He considers (*a*) E. in a single stratum, and (*b*) E. in many layers.

(*a*) *Epithelium in a single stratum* may be composed of:

1. *Rounded, polygonal cells*, constituting the variety known as pavement or tessellated E., and occurring as an investment of the serous membranes of most synovial membranes, of the lining membrane of the heart and of the veins, of the canals of glands, etc.

2. *Fusiform, superficially united cells* (fusiform E.), as the E. of the arteries and of many veins.

3. *Cylindrical cells* (cylinder E.), as in the intestine from the stomach to the termination of the alimentary canal, in the excretory ducts of all the glands opening into the intestine, etc. Various illustrations of this cylinder E. are given in the article DIGESTION, ORGANS AND PROCESS OF.

4. *Cylindrical or conical ciliated cells*, as the E. of the more minute bronchial tubes, of the nasal cavities, and of the uterus.

5. *Rounded ciliated cells*, as the ciliated pavement E. of the ventricles of the brain in the fetus.

(*b*) *Epithelium in many layers* may be composed of:

1. *Cylindrical or rounded cells below, and more or less flattened cells above.* This is termed laminated pavement E., and occurs in the mouth, lower part of pharynx, esophagus, bladder, etc.

2. *Rounded cells below, more elongated ones in the middle, and ciliated conical ones above.* This is termed laminated ciliary E., and occurs in the larynx, trachea, and larger bronchial tubes, in the greater part of the nasal cavity, etc.

In all the varieties of E., the layer of external cells is being constantly disintegrated and replaced by the layer immediately beneath.

The uses of the chief varieties of E., especially of ciliated E., require some notice.

The polygonal or pavement E. mainly acts like the epidermis, as a protecting medium to the soft parts beneath.

The cylindrical E. additionally takes an active part in the process of secretion. Illustrations of the function of the cells forming this variety of E. are given in the articles CELLS, ANIMAL: DIGESTION, ORGANS AND PROCESS OF; and the subject will be further noticed under the head SECRETION.

In connection with ciliated E., we must notice *ciliary motion* generally, in so far as it occurs in the animal kingdom. Certain surfaces which are lubricated by a fluid, are covered with a multitude of hair-like processes of extreme delicacy and minuteness (their length varying from $\frac{1}{1000}$ to $\frac{1}{2000}$ of an inch), which from their shape are termed *cilia*, from *cilium*, an eyelash. During life, and for a certain period after death, these filaments exhibit a remarkable movement, each cilium bending rapidly in one direction, and rapidly returning to its original position (according to Krause, these movements range from 190 to 230 in a minute). On examining a ciliated surface with a high magnifying power, the motion presents an appearance somewhat resembling that of a cornfield agitated by a steady breeze. Any minute objects coming in contact with the free extremities of the cilia are urged onward in the direction of the predominant movement: and the best method of observing the course of the ciliary current is to sprinkle the surface with a little powdered charcoal, grains of which may speedily be seen to move onwards in a definite direction.

An easy way to observe this phenomenon is to detach, by scraping with a knife, a small piece of E. from the back of the throat of a living frog. The scales, moistened with water or serum, will continue to exhibit the movement of their adherent cilia for a very considerable time, provided the piece be kept duly moistened. On one occasion, a piece prepared in this way by Mr. Bowman and Dr. Todd exhibited motion for 17 hours; and it would probably have continued doing so for a longer time, had not the moisture around it evaporated; and if the E. is not removed from the body of an animal that had been killed, the motion continues much longer. In a turtle, after death by decapitation, it lasted, in the mouth, 9 days; in the trachea and lungs, 13 days; and in the esophagus, 16 days. In man and mammals, it seldom lasts 2 days, and usually ceases much sooner. The necessary condition for their movement appears to be the integrity of the cells to which they are attached; for as soon as these shrink up for want of moisture, or undergo any physical change, the cilia cease their characteristic action. We know nothing with certainty regarding the mechanism or source of ciliary motion, except that (as it continues on detached E.) it is independent of both the vascular and nervous systems.

This phenomenon exists very widely throughout the animal kingdom. Dr. Sharpey, in his article CILIA* (published upwards of 40 years ago), notices its occurrence in the

* In the *Cyclopædia of Anatomy and Physiology.*

infusoria, in polyps and their ova, in acalephæ, actiniæ, echinodermata, annelida, mollusca, and the molluscoids (e.g., ascidians), in reptiles, birds, and mammals. Since the date of that article, it has been discovered in sponges, and in one or two exceptional cases in fishes; but it has never been found in any part of the body of articulata (crustaceans, insects, or arachnidans). The parts on which it occurs are (1) the skin or surface of the body, (2) the respiratory, (3) the alimentary, and (4) the genito-urinary systems; and it has been observed in the ova of numerous classes of animals, from reptiles downwards to infusoria. In most of the parts in which we observe it, its use appears to be of a mechanical nature—viz., to convey the fluids or other matters along the surfaces on which the cilia exist, or, as in the infusoria, to carry the entire animal through the water.

1. Cilia have been found on the external surface in batrachian larvæ, in mollusca, annelida, echinodermata, actiniæ, medusæ, polypi, and infusoria. In most cases, their function is respiratory, but in many instances it is also locomotive or prehensile.

2. Ciliary motion has been observed on the lining membrane of the air-passages of mammals, birds, and reptiles, where, whatever may be its other uses, it serves to convey the secretions along the membranes, together with any foreign matters that may be present. It exists also on the external gills of batrachian larvæ, and on the respiratory organs of mollusca and annelida. The cilia which exist externally on still lower animals without separate respiratory organs, assist in the respiratory process, by renewing the water on the surface.

3. It occurs in the mouth, throat, and gullet of various reptiles, and the alimentary canal of the mollusca, echinodermata, many annelida, and acalephæ. It is not easy, as Dr. Sharpey observes, to see the purpose of the motion in all these cases. In some, it may merely convey secreted matters along the surface of the lining membrane; and in others it seems to serve in place of ordinary deglutition, to carry food into the stomach.

4. It is observed on the surface of the reproductive organs of mammals, birds, and reptiles. From the direction of the current being from without inwards, the office of the cilia may be to hurry down the ovum, in addition to removing the mucous secretion of the membrane.

In reptiles and fishes, ciliary motion exists at the neck of each uriniferous tube. The movement is directed towards the tube, and favors the flow of the watery portion of the secretion towards it.

There are some situations, both in man and the lower animals, in which it is difficult to determine what functions the ciliary motion can perform, as, for example, in man, in the ventricles of the brain; and in the frog, in the closed cavities of the pericardium and peritoneum.

EPIZO'A. This term is applied to those parasitic creatures which live on the bodies of other animals, and derive their nourishment from the skin. Our space will only allow of our noticing those that infest man. They may be divided into two groups: (1) Those which live upon the surface of the skin, and (2) those which live in the skin. Fleas, lice, bugs, ticks, etc., belong to the first group; the itch-insect or *sarcoptes*, the pimple-mite or *demodex folliculorum*, and possibly some other species of the *acaridæ*, to the second.

In a zoological point of view, all the E. that infest the human subject are insects or arachnidans. The parasitic insects are: I. *Pulicida*, or *fleas*, including—1. The common flea, or *pulex irritans;* 2. The sand-flea, or *pulex penetrans*, known also as the chigo, chigger, etc. II. *Acanthida*, or *soft bugs*, including the common bed-bug or *acanthia* (s. *cimex*) *lectularia*. III. *Pediculida*, or *lice*, including—1. The common louse, or *pediculus capitis;* 2. The body louse, or *pediculus vestimenti;* 3. The crab louse, or *pediculus* (s. *phthirius*) *pubis;* 4. The louse occurring in phthiriasis, or *pediculus tabescentium*.

The parasitic arachnidans belong to the order of *acarida*, or mites; indeed, most of the animals forming the different families of this order lead a parasitic existence. We have—I. *Demodicida*, including the pimple-mite or *demodex* (s. *acarus*) *folliculorum* (the dog and the sheep possess each a special demodex. II. *Sarcoptida*, including the itch-mite or *sarcoptes* (s. *acarus*) *scabiei*. (Most of our domestic animals seem to be infested by a special sarcoptes, the species of which are numerous.) III. *Ixodida* or ticks, including—1. The American tick or *ixodes hominis* (common in Brazil); 2. The common wood-tick (dogs' tick), or *ixodes ricinus*. There are probably many species of ixodes which are occasionally found on man. IV. *Gamasida*, or beetle lice, including—1. The bird-mite, or *dermanyssus avium* (occasionally found on sickly persons); 2. The Miana bug, or *argas persicus* (common in some parts of Persia, and especially at Miana); 3. The chincha bug, or *argas chinche* (occurring in Columbia). V. *Orobatida*, or grass-lice, including the harvest-bug, or *leptus autumnalis*. See the articles BUG, FLEA, ITCH-MITE, LOUSE, TICKS.

EPIZÖOTICS (Gr. *epi*, upon, and *zöon*, an animal) are diseases of animals which manifest a common character, and prevail at the same time over considerable tracts of country. Like epidemics, they appear to depend upon some peculiar and not well ascertained atmospheric causes; where the cases are neglected or overcrowded, they also frequently become contagious; they are apt to take on a low type of fever, and

are better treated by supporting than by reducing remedies. Influenza in horses, and pleuro-pneumonia and vesicular epizootic in cattle, are examples.

EPOCH, in astronomy, is an abbreviation for "longitude at the E.;" it means the mean heliocentric longitude of a planet in its orbit at any given time—the beginning of a century, for instance. The E. of a planet for a particular year is its mean ongitude at mean noon, on Jan. 1, when it is leap year, and on Dec. 31 of the preceding year, when it is a common year. The E. is one of the elements of a planet's orbit.

EP'OCH, in chronology. See CHRONOLOGY.

EP'ODE is the last part of the chorus of the ancient Greeks, which they sung after the strophe and antistrophe, when the singers had returned to their original place. The E. had its peculiar measure of syllables and number of verses. See CHORUS.

EPP'ING, a t. in the w. of Essex co., England, in a pleasant healthy situation, at the n. end of E. forest, 16 m. n.n.e. of London. It has a very irregular appearance. Pop. '71, 2,275. It is noted for its cream, butter, sausages, and pork. It sends large quantities of butter to London. E. royal forest, formerly under the name of Waltham forest, where our ancient kings enjoyed much sport, covered all Essex, and extended almost to London. It is now limited to 60,000 acres in the s.w. part of the county. Of this tract, only 12,000 acres are in wastes and woods, the rest being now inclosed as private property. In the forest, 5 m. from E., is queen Elizabeth's hunting-lodge. Separated by the river Roding from E. forest is Hainault forest, lately disforested. Here for many centuries a fair was held under the enormous Fairlop oak, not now existing, and a stag was yearly turned out in the forest on Easter Monday, for the amusement of the public. To this day, a stag is turned out yearly for the amusement of Cockney huntsmen.

EPROUVETTE is a machine for proving or testing the strength of gunpowder. It was invented or suggested in the last century by Robins, but was greatly improved by Dr. Hutton.

The *gun* E. determines the strength of gunpowder by the amount of recoil produced. A small gun, usually a "half-pounder," is fixed to the lower end of an iron rod; its base being adjusted to an arm projecting from the rod; or else it is suspended from an iron frame. A horizontal steel axis is fixed to the rod or frame about which the gun may vibrate. A pointed iron rod or style projects downwards from the lower side of the gun, and touches a groove filled with soft wax; the groove is so shaped that, when the gun recoils, the point cuts a path for itself along this wax; and the length of this path determines the amount of recoil. Sometimes a brass graduated arc with an index is used instead of the pointed style and the waxed groove; but the principle of action is just the same. On the arc the recoil should vary from 26° for new fine-grain powder to 20° 5′ for old powder of coarse grain. This system of proof is resorted to annually at minor and foreign stations for the proof of all powder in store, to ascertain the amount of deterioration; five rounds constitute the minimum proof. Before the E. is resorted to, the powder must pass the test of specific gravity, by weighing not less than 55 lbs. to the cubic foot.

The *mortar* E. determines the strength of gunpowder by the distance to which a ball is projected, instead of the distance to which the piece recoils. It is generally a mortar of 8-inch bore, in which 2 to 4 ozs. of powder is employed to propel an accurately turned iron shot to a distance of about 120 yards. Other things being equal, the strongest gunpowder sends the shot to the greatest distance; and this is the usual mode adopted in testing gunpowder supplied to the government by various contractors.

The ordinary E. is an instrument shaped like a small pistol without a barrel, and having its breach chamber closed by a flat plate connected with a strong spring. On the explosion of the powder against the plate, it is driven back to a distance indexed according to the strength of the powder, and is retained at its extreme state of propulsion by a ratchet wheel.

EPSOM (said to have originally been Ebbasham) is a small market t. on the margin of the Banstead downs in Surrey, 15 m. s.s.w. of London by road, and 14 m. by the London and Southwestern railway. The famed sulphate of magnesia springs of E. gave their name to the E. salts formerly manufactured from them. This manufacture has been abandoned from the ease with which these salts can be made artificially. The royal medical college, erected on the Downs, and established in 1851, provides education for about 170 boys, the sons of medical men, and affords a home to decayed members of the profession and their widows. Pop. '71, 6,276. On the Downs, 1½ m. s. of the town, the famous E. horse-races are held yearly. They are said to have been instituted by Charles I., but have become of greater importance since the institution of the Derby stakes in 1780 (see DERBY DAY). The races last four days, and as many as 100,000 persons often assemble to witness the most important of them.

EPSOM SALT, or SULPHATE OF MAGNESIA ($MgO+SO_3HO$), occurs not only in the water of mineral springs, as at Epsom, Seidlitz, and many other places; but also as an efflorescence on the surface of various rocks, sometimes along with alum, as at Hurlet, in Renfrewshire; and on the ground, as in some parts of Spain and of the Russian

steppes. It sometimes occurs snow-white and very pure, sometimes discolored by impurities; and is either in the form of fine thread-like crystals, or in crusts, flakes, granules, etc. Its crystals are prisms, almost rectangular. For purposes of commerce, it is obtained by the action of dilute sulphuric acid upon magnesian limestone. See MAGNESIUM.

E. S. is a well-known purgative remedy much in use in household medicine. It may be given in doses from 2 drams to 1 oz., according to the effect required, in a tumbler of water. The disagreeable bitter taste is much relieved by acidulating with nearly a teaspoonful of dilute sulphuric acid to each ounce of salt.

EPWORTH, a t. in the n.w. of Lincolnshire, England, 30 m. n.n.w. of Lincoln. It chiefly consists of one street, above 2 m. long. The chief employments are hemp and flax dressing, rope-making, and malting. Pop. '71, 2,295. John Wesley, founder of Methodism, as well as Kilham, founder of the seceding Wesleyans, was born here.

EQUABLE MOTION is that by which equal spaces are passed over in equal times.

EQUALITY. See LIBERTY, EQUALITY, FRATERNITY.

EQUATION, ANNUAL, one of the most conspicuous of the subordinate fluctuations in the moon's motion, due to the action of the sun, which increases with its proximity to the earth and her satellite. It consists in an alternate increase and decrease in her longitude, corresponding with the earth's situation in its annual orbit, i.e., to its angular distance from the perihelion, and therefore having a year instead of a month, or aliquot part of a month, for its period. For an explanation of the mode of its production, the reader is referred to Herschel's *Outlines of Astronomy*, art. 738, *et seq.* The subject is too abstruse for explanation in this work.

EQUATION, DIFFERENTIAL, is an equation involving differential co-efficients (see CALCULUS); such is $\frac{d^2y}{dx^2} + a\frac{dy}{dx} = x$; from which it is required to find the relation between y and x. The theory of the solution of such equations is an extension of the integral calculus, and is a branch of study of the highest importance.

EQUATION, FUNCTIONAL. See FUNCTIONS.

EQUATION, LUNAR. See LUNAR THEORY.

EQUATION OF THE CENTER. If the earth moved uniformly round the sun in a circle, it would be easy to calculate its longitude or distance from the line of equinoxes at any time. One year would be to the time since the vernal equinox as 360° to the arc of longitude passed over. But the orbit of the earth is not circular, nor is its motion uniform; the orbit is slightly elliptical, and the motion is quicker at perihelion than at aphelion. The true rule, then, for ascertaining the earth's longitude is contained in the following proportion: one year is to the time elapsed as the whole area of the earth's orbit is to the area swept over by the radius vector in the time. This is a deduction from Kepler's law (see CENTRAL FORCES), that, in planetary motion, equal areas (not *angles*) are swept over in equal times. The area swept over being ascertained from the laws of the earth's motion, and the elements of its orbit, it is a question of geometry to ascertain the *angle* corresponding to the area, or the true longitude. In astronomy, the longitude, as calculated on the supposition that the earth moves uniformly in a circle, is called the *mean* longitude of the earth; and it happens, from the orbit being, as we said, but slightly different from a circle, that the mean and true longitude differ but slightly. The quantity by which the true and mean longitudes differ is called the *equation of the center;* and this is sometimes to be added to, and sometimes to be subtracted from the mean longitude, to obtain the true; and sometimes it is zero.

EQUATION OF EQUINOXES is the difference between the true position of the equinoxes, and the position calculated on the supposition that their motion is uniform. See PRECESSION.

EQUATION OF LIGHT. In astronomical observations, the visual ray by which we see any body is not that which it emits at the moment we look at it, but which it *did* emit some time before, viz., the time occupied by light in traversing the interval which separates it from us. If, then, the body be in motion, its aberration, as due to the earth's velocity, must be applied as a correction, not to the line joining the earth's place at the moment of observation with that occupied by the body, (as seen) at the same moment, but at that antecedent moment when the ray quitted it. Hence is derived a rule applied by astronomers for the rectification of observations made on a moving body, viz., from the known laws of its motion and the earth's, calculate its relative angular motion in the time taken by light to pass from it to the earth. This motion is the total amount of its apparent displacement. Its effect is to displace the body in a direction contrary to its apparent motion, an effort one part of which is due to aberration, properly so-called (see ABERRATION) resulting from the composition of the motions of the earth and of light, and another part to the fact of the passage of light occupying time. The *equation of light* is the allowance to be made for the *time* occupied by the light in traversing a variable space.

EQUATION OF PAYMENTS. The problem considered under this head in books of arithmetic is to find a time when, if a sum of money be paid by a debtor, which is equal to the sum of several debts payable by him at different times, no loss will be sustained by either the debtor or creditor. The rule generally given is as follows: Multiply each sum due by the time at which it is payable, and then divide the sum of the products by the sum of the debts: the quotient is the equated time. For example, if £10 be due at one month, and £20 at two months, find as an equivalent when the whole £30 may be paid at once. Ans. $\frac{10\times1+20\times2}{30} = 1\frac{2}{3}$ months. This rule is, however, incorrect where the debts are unequal, because it takes no account of the balance of interest and discount. A correct rule for the case of two debts and simple interest is subjoined. Let d and D denote the debts, t and T the times of payment, and r one year's interest on D. Then if $A = T + t + \frac{D+d}{dr}$, and $B = Tt + \frac{DT+dt}{dr}$, the equated time will $= \frac{1}{2}A - \frac{1}{2}\sqrt{(A^2 - 4B)}$. When three or more debts are concerned, the plan is to find by this formula the equated time for the first two, and then for their sum payable at their equated time, and the third, and so on. The common rule is, however, sufficiently correct for ordinary use.

EQUATION, PERSONAL, a correction important chiefly in astronomical observations. Two observers, each of admitted skill, often differ in their record of the same event—as the passage of a star before the wires of a transit instrument—by a quantity nearly the same for all observations by those persons. This quantity is their relative personal equation. Each observer habitually notes the time earlier or later than the fact, by a minute and nearly uniform portion of a second. This quantity is his absolute personal equation. The correction is of no value when comparison is made between the records of the same observer, since each is in error in the same way, but it becomes important when the work of different observers is combined. The value and sign of the personal equation is found for each observer by the discussion of a large series of observations. It is a reliable correction for the work of only trained observers, who have, by long practice, acquired a habitual method of work which is uniform, even their errors conforming to a system.

EQUATIONS. An equation may be defined to be an algebraical sentence stating the equality of two algebraical expressions, or of an algebraical expression to zero. From another point of view, it is the algebraical expression of the conditions which connect known and unknown quantities. Thus (1), $xy = 24$, and (2), $x^2 + y^2 = 52$, are two E. expressing the relations between the unknown quantities x and y and known quantities. Generally, E. are formed from observations from which an object of inquiry may be inferred, but which do not directly touch the object. Thus, suppose we wish to ascertain the lengths of the sides of a rectangular board which we have no means of measuring, and that all the information we can get respecting it is, that it covers (say) 24 sq. ft., and that the square on its diagonal is (say) 52 sq. feet. From these facts, we can form E. from which we may determine the lengths of the sides. In the first place, we know that its area is equal to the product of its sides, and if we call these x and y, we have $xy = 24$, the first of the E. above given. Again, we know that the sum of the squares on the sides is equal to the square on the diagonal; hence, we have the second equation, $x^2 + y^2 = 52$. From these two E., we should be able to determine the values of x and y. The determination of these values is called the *solution* of the equations.

E. are of several kinds. Simple E. are those which contain the unknown quantity in the first degree; thus, $\frac{x}{2} + 3 = 4$, is a simple equation. Quadratic E. are those which contain the unknown quantity in the second degree: $x^2 + 5x - 36 = 0$, is a quadratic equation. Cubic and biquadradic E. involve the unknown quantity in the third and fourth powers respectively. For the higher E., there are no special names; they are said to be E. of the degree indicated by the highest power of the unknown which they contain. Simultaneous E. are those which involve two or more unknown quantities, and there must always be as many of them, in order to their determinate solution, as there are unknown quantities. The E. first mentioned—viz., $xy = 24 - x^2 + y^2 = 52$, are simultaneous equations. It may be mentioned, that in the course of solving such E., the principal difficulties encountered are always ultimately the same as in the solution of E. containing only one unknown quantity. For instance, in the E. just given, if we substitute in the second the value of y as given by the first, or $y = \frac{24}{x}$, we have $x^2 + \frac{(24)^2}{x^2} = 52$, which may be solved as a quadratic equation. The general theory of E., then, is principally concerned with the solution of E. involving one unknown quantity only, for to this sort all others reduce themselves. Indeterminate E. are such as do not set forth sufficient relations between the unknown quantities for their absolute determination, and which accordingly admit of various solutions. Thus, $xy = 24$ is an indeterminate equation, which is satisfied by the values $x = 3$, $y = 8$; or

$x = 6$, $y = 4$; or $x = 2$, $y = 12$. We require some other relation, such as $x^2 + y^2 = 52$, to enable us to fix on one of the sets of values, x and y, as those of x. For other kinds of E., see EXPONENT AND EXPONENTIAL, FUNCTIONS, and DIFFERENCE.

The object of all computation is the determination of numerical values for unknown quantities, by means of the relations which they bear to other quantities already known. The solution of E., accordingly, or, in other words, the evolution of the unknown quantities in them, is the chief business of algebra. But so difficult is this business, that, except in the simple cases where the unknown quantity rises to no higher than the second degree, all the resources of algebra are as yet inadequate to effect the solution of E. in general and definite terms. For E. of the second degree, or quadratic E., as they are called, there is a rigorous method of solution by a general formula; but as yet no such formula has been discovered for E. even of the third degree. It is true, that for E. of the third and fourth degrees general methods exist, which furnish formulas which express under a finite form the values of the roots. See CARDAN and CUBIC EQUATIONS. But all such formulas are found to involve *imaginary* expressions, which, except in particular cases, make the actual computations impracticable till the formulas are developed in infinite series, and the imaginary terms disappear by mutually destroying one another. What is called Cardan's formula, for instance (and all others are reducible to it), is in this predicament whenever the values of the unknown quantity are all real; and accordingly, in nearly all such cases, the values are not obtainable from the formulæ directly, but from the infinite series of which they are the compact expression. But though such formulæ as Cardan's are useless for the purpose of numerical computation, the search for them has led to most of the truths which constitute the general theory of E., and through which their *numerical solution* may be said to have been at last rendered effective and general. This method of numerical solution is a purely arithmetical process, performed upon the *numerical co-efficients* of E., and it is universally applicable, whatever the degree of the equation may be. With this method are connected the names of Budan, Fourier, Horner, and Sturm. We cannot here enter into an account of it; the reader should consult on the subject Young's *Theory and Solution of Algebraical Equations of the Higher Orders;* Peacock's *Treatise on Algebra;* and La Grange's work on *Numerical Solutions.*

The rules for the solution of the simpler forms of E. are to be found in all elementary text-books of algebra. It must suffice to notice here a few of the leading general properties of equations. By the roots of an equation are meant those values real or imaginary of the unknown which satisfy the equality; and it is a property of every equation to have as many roots and no more as there are units in its degree. Thus, a quadratic equation has two roots; a cubic equation, three; and a biquadratic, four. The quadratic equation $x^2 + 5x - 36 = 0$ has two roots, $+ 9$ and $- 4$, which will be found to satisfy it. Further, the expression $x^2 + 5x - 36 = (x - 9)(x + 4) = 0$; and generally if the roots of an equation

$$F(x) = x^n \pm A_{n-1}x^{n-1} \pm A_{n-2}x^{n-2} \pm \ldots \pm A_1 x \pm A_0 = 0$$

(to which general form every equation of the nth degree can be reduced), are

then
$$\begin{gathered} \pm a_1 \pm a_2 \pm a_3 \ldots \pm a_n \ldots \\ (x \mp a_1)(x \mp a_2)(x \mp a_3) \quad \ldots \\ (x \mp a_n) = F(x) = 0. \end{gathered}$$

Hence, and from observing the way in which, in the multiplication of these factors, the co-efficients

$$A_{n-1},\ A_{n-2} \ldots A_1,\ A^0$$

are formed, we arrive at the following important results:

A_{n-1} = the sum of the roots, with their signs changed.
A_{n-2} = the sum of the products of every two roots, with their signs changed.
A_{n-3} = the sum of the products of every three roots, with their signs changed.
A_0 = the product of the roots, with their signs changed.

The factors, it will be observed, are formed thus: If $+ a_1$ be a root, then $x = a_1$, and $x - a_1 = 0$ is the factor. If the root were $- a_1$, then $x = - a_1$; and the factor would be $x + a_1 = 0$. Observing now the way in which, in multiplying a series of such factors, the co-efficients of the resulting polynominal are formed, we arrive at this: that a complete equation cannot have a greater number of positive roots than these *changes* of sign from $+$ to $-$ and from $-$ to $+$ in the series of terms forming its first member; and that it cannot have a greater number of negative roots than there are *permanencies* or repetitions of the same sign in proceeding from term to term. From the same source, many other general properties of E., of value in their arithmetical solution, may be inferred. The subject is, however, too vast to be more than glanced at here.

EQUATION OF TIME. It will be seen from the article EQUATION OF THE CENTER (q.v.) that the earth's motion in the ecliptic—or what is the same thing, the sun's apparent motion in longitude—is not uniform. This want of uniformity would of itself obviously cause an irregularity in the time of the sun's coming to the meridian on successive days; but besides this want of uniformity in the sun's apparent motion in the ecliptic, there is another cause of inequality in the time of its coming on the meridian—

viz., the obliquity of the ecliptic to the equinoctial. Even if the sun moved in the equinoctial, there would be an inequality in this respect, owing to its want of uniform motion; and even if it moved uniformly in the ecliptic, there would be such an inequality, owing to the obliquity of its orbit to the equinoctial. These two independent causes conjointly produce the inequality in the time of its appearance on the meridian, the correction for which is the equation of time.

When the sun's center comes to the meridian, it is apparent noon, and if it moved uniformly on the equinoctial, this would always coincide with *mean noon*, or 12 o'clock on a good solar clock. But from the causes above explained, mean and apparent noon differ, the latter taking place sometimes as much as 16¼ minutes before the former, and at others as much as 14¼ minutes after. The difference for any day, called, as we have said, the equation of time, is to be found inserted in ephemerides for every day of the year. It is nothing or zero at four different times in the year, at which the whole mean and unequal motions exactly agree—viz., about the 15th of April, the 15th of June, the 31st Aug., and the 24th December. At all other times, the sun is either too fast or too slow for clock-time. In the ephemerides above referred to, the sign + or − is prefixed to the equation of time, according as it is to be added to or subtracted from the apparent time to give the mean time. See NAUTICAL ALMANAC.

EQUA'TOR, CELESTIAL, is the great circle in the sky corresponding to the extension of the equator of the earth.

EQUATOR, TERRESTRIAL, the great circle on the earth's surface dividing the earth into the northern and southern hemispheres, and half way between the poles.

EQUATO'RIAL, an important astronomical instrument, by which a celestial body may be observed at any point of its diurnal course. It consists of a telescope attached to a graduated circle, called the declination circle, whose axis penetrates at right angles that of another graduated circle called the hour circle, and is wholly supported by it. The pierced axis, which is called the principal axis of the instrument, turns on fixed supports; it is pointed to the pole of the heavens, and the hour circle is of course parallel to the equinoctial. In this position, it is easy to see that a great circle of the heavens corresponding to the declination circle, passes through the pole, and is an hour circle of the heavens. The telescope is capable of being moved in the plane of the declination circle. If, now, the instrument be so adjusted that the index of the declination circle must point to zero when an equatorial star is in the center of the field of view of the telescope, and the index of the hour circle must point to zero when the telescope is in the meridian of the place, it is clear that when the telescope is directed to any star, the index of the declination circle will mark the declination of the star; and that on the other circle its right ascension. If the telescope be clamped when directed on a star, it is clear that, should the instrument be made to rotate on its principal axis with entire uniformity with the diurnal motion of the heavens, the star would always appear in the field of view. This motion of rotation is communicated to the instrument by clock-work.

EQUESTRIANISM. See HORSEMANSHIP.

EQUESTRIAN ORDER, or E'QUITES. This body originally formed the cavalry of the Roman army, and is said to have been instituted by Romulus, who selected from the three principal Roman tribes 300 equites. This number was afterwards gradually increased to 3,600, who were partly of patrician and partly of plebeian rank, and required to possess a certain amount of property. Each of these equites received a horse from the state; but about 403 B.C., a new body of equites began to make their appearance, who were obliged to furnish a horse at their own expense. These were probably wealthy *novi homines*, men of equestrian fortune, but not descended from the old equites (for it should be observed that the equestrian dignity was hereditary). Until 123 B.C., the equites were exclusively a military body; but in that year Caius Gracchus carried a measure, by which all the *judices* had to be selected from them. Now, for the first time, they became a distinct order or class in the state, and were called *ordo equestris*. In 70 B.C., Sulla deprived them of this privilege; but their power did not then decrease, as the forming of the public revenues appears to have fallen into their hands. After the conspiracy of Catiline, the E. O., which on that memorable occasion had vigorously supported the consul Cicero, began to be looked upon as a third estate in the republic; and to the title of *senatus populusque Romanus* was added *et equestris ordo*. But, even in the beginning of the empire, the honor, like many others, was so indiscriminately and profusely conferred, that it fell into contempt, and the body gradually became extinct. As early as the later wars of the republic, the equites had ceased to constitute the common soldiers of the Roman cavalry, and figure only as officers.

EQUESTRIAN STATUE, the representation of a man on horseback. Equestrian statues were awarded as a high honor to military commanders and persons of distinction in Rome, and latterly were, for the most part, restricted to the emperors, the most famous in existence being that of the emperor Marcus Aurelius, which now stands in the piazza of the capitol at Rome. It is the only ancient E. S. in bronze that has been preserved; an exemption which it probably owed to the fact, that for centuries it was supposed to

be a statue of Constantine. The action of the horse is so fine, and the air of motion so successfully given to it, that Michael Angelo is said to have called out to it "*Camminal*" —(Go on, then!). It was originally gilt, and traces of the gilding are still visible on the horse's head. So highly is this statue prized, not only for its artistic but its historical value, that an officer used regularly to be appointed by the Roman government to take care of it, under the designation of the *custode del cavallo*. On the occasion of the rejoicings by which Rienzi's elevation to the tribuneship was celebrated in 1347, wine was made to run out of one nostril and water out of the other of this famous horse. The statue then stood in front of the church of St. John Lateran, near to which it was found, and a bunch of flowers has always been presented annually to the chapter of that basilica, in acknowledgment of ownership, since it was removed to its present site on the capitol. All European capitals are adorned, or disfigured, by numerous equestrian statues, London belonging pre-eminently to the latter category.

EQUIANGULAR, having equal angles. A figure is said to be E. all whose angles are equal to one number, as a square, or any regular polygon. All triangles and other figures are said to be E. one with another whose corresponding angles are equal.

EQUIDÆ, or SOLIDUNGULA (Lat. solid-hoofed), a family of mammalia of the order *pachydermata*, containing only a small number of species, which so nearly resemble each other that almost all naturalists agree in referring them to one genus, *equus*. They are distinguished from all other quadrupeds by the complete consolidation of the bones of the toes, or the extraordinary development of one toe alone in each foot, with only one set of phalangeal and of metacarpal or metatarsal bones, and the extremity covered by a single undivided hoof. There are, however, two small protuberances (*splint bones*) on each side of the metacarpal or metatarsal bone (*canon* or *cannon bone*), which represent other toes. The E. have six incisors in each jaw, and six molars on each side in each jaw; the males have also two small canine teeth in the upper jaw, sometimes in both jaws, which are almost always wanting in the females. The molars of the E. have square crowns, and are marked by laminæ of enamel with ridges forming four crescents. There is a wide space between the canine teeth and the molars. The stomach of the E. is simple, but the intestines are long, and the cæcum extremely large; the digestive organs being thus very different from those of the ruminants, but exhibiting an equally perfect adaptation to the same kind of not easily assimilated food. Another distinctive peculiarity of the E. is, that the females have two teats situated on the pubes, between the thighs. But notwithstanding these characters, so dissimilar to those of the ruminants, they approach them very much in their general conformation, and may be regarded as a connecting link between pachyderms and ruminants. The largely developed and flexible upper lip is a character which belongs to the former rather than to the latter order.

The E. are now found in a truly wild state only in Asia and Africa. Fossil remains exist in the newer geological formations in great abundance in many parts of the old world; very sparingly, however, in the new, although the bones of a peculiar and distinct species (*equus curvidens*), belonging to the pleiocene period, have been found in South America.

The horse and the ass are by far the most important species of this family. The dziggethai has also been domesticated and made useful to man. Of the other species, the zebra, quagga, and dauw, it is generally believed that they are incapable of useful domestication.

EQUILATERAL, having equal sides. A square is equilateral. The equilateral hyperbola is that whose axes and conjugate diameters are equal.

EQUILIBRIUM, the state of rest or balance of a body or system, solid or fluid, acted upon by various forces. See STATICS and HYDROSTATICS.

EQUI'NIA, or GLANDERS. In another part of this work, glanders has been considered simply as a disease peculiar to animals, and especially the horse. We shall here consider it as a disease affecting man, to whom it is transmissible from animals. It is remarkable that although the disease in the horse and ass has been recognized from the time of Aristotle (who describes it as common in the ass), it was not till the year 1810 that Waldinger of Vienna drew attention to the fact, that special precautions should be taken in the dissection of horses affected with glanders and farcy, inasmuch as the most serious and often fatal consequences might arise from the inoculation of the morbid matter. Strangely enough, however, he does not seem to have noticed that the disease thus induced in man is identical with that of the horse; and it was not till 1821 that Schilling recognized this important point. It was not till a living physician, Dr. Elliotson, published his memoir, *On the Glanders in the Human Subject*, in 1830, that the attention of the medical profession in this country was directed to the subject. In 1837, Rayer, in his memoir *De la Morve et du Farcin chez l'Homme*, collected all the cases that had been observed up to that date, and gave a complete description of the various forms of glanders both in the horse and in man; and in 1843, Tardieu published his investigations, *De la Morve et du Farcin Chroniques*. It is to these writers and to the brothers Gamgee ("Glanders—Equinia," by Arthur Gamgee, M.D., and John Gamgee, in Reynolds's

System of Medicine, vol. i. 1866) that we owe almost all our knowledge of this terrible disease.

In the great majority of cases, the disease is transmitted from the horse, the ass, or the mule to man; but several instances have been recorded in which it has been transmitted from one human being to another. The disease is no doubt generally due to inoculation, but the virus is also probably capable of being absorbed by unbroken mucous membrane. Most of the recorded cases have occurred in men of good constitution and in the prime of life. The four varieties of this disease which occur in the horse have also been observed in man—viz., (1) acute glanders, (2) chronic glanders, (3) acute farcy, and (4) chronic farcy.

Acute glanders is the commonest form. The period of inoculation ranges, in the majority of cases, from three days to a week. If there is a distinct wound or abrasion through which the poison has been absorbed, the parts around the broken surface become red, tense, and painful, often before the appearance of any of the constitutional symptoms, such as a general feeling of illness, great depression of the spirits, headache, rigors, increased rapidity of the pulse, and pain in the joints. A characteristic pustular eruption, often accompanied by bullæ or blebs, appears on the face and limbs; and abscesses frequently occur on the face and about the principal joints. A yellow, purulent, fetid discharge, often mixed with blood, exudes from the nasal mucous membrane, which is invariably the seat of a pustular eruption, or of ulcerations. The prostration which is observable from the beginning increases during the course of the disease. The pulse becomes weak and frequent, the breathing difficult, the voice feeble, and the bowels very relaxed, the stools being extremely fetid. Delirium now sets in, which is followed by coma and death. Death usually occurs about the end of the second week, but the duration of the disease has been known to vary from three to fifty-nine days.—*Chronic glanders* is so rare an affection in man that it hardly requires notice. The course of the disease usually extends over several months; and only one case of recovery is reported.—*Acute farcy* seems only to differ essentially from acute glanders in the fact of there being no affection in the mucous membrane of the nostrils. The cutaneous eruption may or may not be present; in most cases, it is present, and the disease then follows exactly the same course as glanders. When there is no eruption, there is merely an inflammation of the lymphatic vessels and glands, or *adenitis* and *angeioleucitis* (q.v.), accompanied with the formation of soft subcutaneous tumors at various parts. This form of the disease often terminates favorably, or may merge into *chronic farcy*, which is characterized by the formation of an abscess on the forehead or elsewhere, which is followed by indolent and fluctuating tumors, which follow one another in various parts of the body, open spontaneously, and form very intractable ulcers. The disease usually runs its course in about a year. Of twenty-two cases recorded by Tardieu, six recovered.

Little need be said regarding treatment, since no remedies have been found to exercise any influence in checking the course of acute glanders. Arsenic, combined with strychnia, has been found useful in chronic glanders in the horse, and is recommended by the brothers Gamgee as worthy of trial in man; and some relief might probably be afforded by the application of weak injections of carbolic acid into the nostrils.

EQUINOC'TIAL is the same with the celestial equator. See EQUATOR, CELESTIAL. The E. points are those in which the E. and the ecliptic intersect. See ECLIPTIC. E. time is time reckoned from the moment when the point of Aries passes the vernal equinox. See EQUINOXES. This instant is selected as a convenient central point of a uniform reckoning of time for the purposes of astronomical observers.

E'QUINOXES. Sometimes the equinoctial points (see EQUINOCTIAL) are called the equinoxes. More commonly, by the equinoxes are meant the times when the sun enters those points, viz., 21st Mar. and 22d Sept., the former being called the vernal or spring equinox, and the latter the autumnal. When in the E., the sun, through the earth's rotation on its axis, seems to describe the circle of the equator in the heavens, and the days and nights are of equal length all over the world. At the vernal equinox, the sun is passing from s. to n., and in the northern hemisphere the days are lengthening: at the autumnal, he is passing from n. to s., and the days are shortening. As the earth moves more rapidly when near the sun, or in winter, the sun's apparent motion is not uniform, and it happens that he takes eight days more to pass from the vernal to the autumnal equinox, than from the latter to the former. The equinoctial points are not stationary. See ECLIPTIC.

EQUIP'MENT,—EQUIPAGE, in military matters, are names given to certain of the necessaries for officers and soldiers. During the Crimean war, many officers applied for and obtained money as compensation for the loss or injury of their E., comprising horses, horse-appointments, baggage, saddlery, and accouterments. Equipments issued to private soldiers are expected to last a certain number of years, and small deductions from their pay are made in the event of the articles not lasting the proper time. In those cases (in the English army) where a non-commissioned officer receives a commission on the ground of meritorious service, an allowance of £100, if in the infantry, or £150, if in the cavalry, is made to him to provide an equipment. The E. of a private soldier is often used as a name for the whole of his clothes, arms, and accouterments

collectively. The *equipage* of an army is of two kinds: it includes all the furniture of the camp, such as tents and utensils, under the name of *camp-equipage;* while *field equipage* comprises saddle-horses, baggage-horses, and baggage-wagons.

EQUIPMENT AND RECRUITING, BUREAU OF, a department in the U. S. navy having charge of supplying vessels with rigging, sail, anchors, and all stock necessary for a voyage; also, the managing of the enlistment of seamen and boys, and of the recruiting service generally.

EQUISETUM, a genus of cryptogamous plants, the structure and affinities of which are not yet well understood, but which many botanists regard as constituting a sub-order of ferns, whilst others prefer to make it a distinct order, *equisetaceæ.* The English name HORSE-TAIL is often given to all the species. They have a leafless, cylindrical, hollow, and jointed stem, each joint terminating in a membranous and toothed sheath, which incloses the base of the one above it. The fructification is at the summit of the stem in spikes, which somewhat resembles trobiles (cones), and are formed of scales bearing spore-cases on their lower surface. The spores are minute, oval, or round, green, and each accompanied with four elastic and hygrometrical threads. These threads are sometimes called *elaters,* but it is by no means certain that they are of the same nature with the spiral filaments so called, which are mixed with the spores of many *hepaticæ* (q.v.). Each thread terminates in a kind of club. The stems generally have lateral branches, angular, but otherwise similar in structure to the stem, growing in whorls from the joints; sometimes the stem is simple; or fertile stems are simple, and sterile stems are branched. The species of this genus contain a peculiar acid, called *equisetic acid.* Astringent and diuretic properties exist in these plants, and they were formerly used in medicine, but are not now regarded as of much value. It has been said that they are very injurious to cattle which eat them, but this seems to require confirmation. They abound chiefly in damp soils, and sometimes so much that the plow and harrow, or the grubber, must be employed to extirpate them. Some of them, however, grow in dry fields and gardens; whilst others are found chiefly in ditches or the banks of rivers. They exist in almost all parts of the world, and are seldom of large size, varying from a few inches to a few feet in height, but a comparatively gigantic species has recently been discovered in tropical America. The rough siliceous stems of some species are used for smoothing and polishing wood, particularly those of *E. hyemale,* which are imported into Britain in considerable quantities from Holland, under the name of DUTCH RUSHES. The stems of this species are unbranched, or a little branched only at the base. It is not uncommon in Britain, and is found also, rather sparingly, in North America. It has been proposed to cultivate it, as it grows well under trees, where few other plants would thrive. The stems of other species, as *E. arvense,* the most common of all the British species, are used for scouring tin and pewter vessels.

EQUITABLE DEFENSES at common law were introduced by the common law procedure act (15 and 16 Vict. c. 76, s. 83), whereby it was enacted that the defendant in any cause, and the plaintiff in replevin, where he would be entitled to relief against the judgment on equitable grounds, may plead the facts which entitle him to such relief. The effect of this enactment had been to extend materially the equitable jurisdiction of common law courts, by enabling them to give effect to a plea in cases where, though courts of law had no remedy, a court of equity would have afforded *unconditional* relief. It has been remarked by Pollock, C.B., *Clarke* v. *Laurie,* 26 *Law Jour.* Ex. 36, that "it is an established rule now . . . . that no equitable plea shall be permitted, except in a case where the plea and decision, and judgment of the court upon it, will work out and complete all the equity that belongs to the matter to which the plea refers." A defendant having pleaded an equitable defense at law, was not precluded from resorting to the court of chancery. All this, however, is obsolete, now that law and equity are consolidated, and the same defense is good in all courts alike.

EQUITABLE ESTATES, estates the right to which, according to the strict rules of English common law, was unrecognized, but which received full effect in a court of equity. These estates are the equity of redemption (q.v.) which a mortgagor has in his estate, subject to the mortgage, and the right of *cestui que trust* in a trust estate. Formerly, these interests were not even recognized by courts of law; but by 7 Geo. II. c. 20, and 15 and 16 Vict. c. 76, courts of law were empowered to take notice, and give effect to an equitable interest; and now that law and equity are merged together, the same court protects both.

EQUITABLE MORTGAGE is where a person, having an equitable interest in an estate, mortgages that interest. Thus, a *cestui que trust* may mortgage his estate under the trust, or a mortgagor, who has already mortgaged his estate, may convey his equity of redemption (q.v.) in security of his debt. In these instances, the interest operated upon being purely equitable, the transaction is an equitable mortgage. An equitable mortgage may also be effected by a deposit of title-deeds in security of debt. See MORTGAGE, ESTATE.

EQUITES. See EQUESTRIAN ORDER, *ante.*

EQUITY, COURTS OF, ENGLAND. The administration of justice in England once embraced two great branches, usually known as common law and equity. Speaking generally, it may be said that equity is partly corrective of the common law, partly sup

plementary of it; and from this it follows that, in an almost endless variety of matters, the decision of a court would vary according as it was a court of equity or a court of common law; the equity courts giving remedies in cases where the common law—though it may acknowledge a hardship—sees no wrong, and acknowledging and enforcing rights which the common law does not admit. The anomaly of keeping up two sets of courts, acting on different principles, the one to do justice where the traditions of the other prevent it from doing justice, or its rules require it to do injustice, had long been perceived; it had been found, too, that this arrangement was inconvenient as well as anomalous. Attempts had been made to produce a gradual fusion of the conflicting systems by clothing the common-law courts to some extent with the power of resorting to the remedies and admitting the principles employed in the courts of equity; and these attempts had proved partially successful. In 1873, therefore, the legislature proceeded to make provision for completely revolutionizing the judicial system of England, with a view to getting rid, at one stroke, of its inconvenient and anomalous double system of courts. This was done by the judicature act passed in that year, a measure that was soon afterwards modified in important particulars by other acts passed in 1874 and 1875. These judicature acts did not come into force till the first of Nov., 1875; and various rules and orders have been made in accordance with them. The judicature act merged the existing courts both of equity and common law in one supreme court of judicature, which consisted of a high court of justice, arranged in five divisions, all of them courts of first instance. There was an appeal in a few cases to the privy council; and in the other cases, to the court of appeal, and then the house of lords. In the high court there is now a chancery division, before which, at first, the greater part of the equity business requires to be brought; and it is expressly provided that where the rules of the common law conflict with those of equity, every court is to give effect to the latter. The conflict between common law and equity will henceforth be at an end; but as the sources from which the law of the future will be derived, they will still be referred to. Until the recent change, the courts of equity were the lords justices' court, the master of the rolls' court, and the courts of the three vice-chancellors.

The origin of a separate equitable jurisdiction in England is to be found in the early adoption by the courts of common law of certain set forms for the redress of grievances, and their refusal to apply any remedy to cases which did not fall within those limits. Suitors finding that in numerous cases redress was not to be obtained in the ordinary legal tribunals, had recourse to the king as the fountain of justice, who, sitting in council, heard the complaints upon their merits without reference to the technicalities of law. As early as the reign of Edward I., the practice began to be adopted of delegating to the chancellor the petitions referred to the king. In this reign, an attempt was made to devise a method whereby the common-law courts should be made the sole tribunal for the redress of grievances. By the statute of Westminster the second (13 Edw. I. c. 24), it was enacted that whenever a case occurred requiring a new writ, the chancery (in which all suits took their rise) should frame a new writ to suit the case. This statute was never acted upon to the purpose intended; but in the reign of Edward III. its provisions were made use of by John Waltham, who was then chancellor, to introduce the writ of *subpœna* (q.v.) returnable to chancery only, whereby the lord chancellor's court was made the forum of a large class of causes. "From this time," says Mr. Spence (*Chancery Jurisdiction*, i. 338), "suits by petition or bill without any preliminary writ became a common course of procedure before the chancellor, as it had been in the council. On the petition or bill being presented, if the case called for extraordinary interference, a writ was issued by the command of the chancellor, but in the name of the king, by which the party complained against was summoned to appear before the court of chancery, to answer the complaint and abide by the order of the court. Thus was introduced into chancery the practice of examining upon oath the party in the cause, a practice unknown at that time to common law. The cases heard in the chancery courts were decided upon the principles of *honesty*, *equity*, and *conscience*. The next step which tended to widen the equitable jurisdiction of the chancery courts, was the exclusion of the Roman law from the courts of common law. This was effected by a prohibition of the judges in the reign of Richard II. One result of this prohibition was to exclude altogether from the common-law courts the question of trusts. The court of chancery at once proceeded to give a remedy in this class of cases, which has ever since formed the most important branch of the equitable jurisdiction of that court. The equitable jurisdiction of the court of chancery in matters of fraud is to be traced to the abolition of the star chamber (q.v.) in the reign of Charles I. Thus sprung up in England jurisdiction of the court of chancery as a court of equity. It is not, however, to be supposed that the system administered in courts of equity is an arbitrary one at the pleasure of the presiding judge. Such probably was the case on the first introduction of the equity jurisdiction; but as time progressed, the decisions of previous judges formed precedents for their successors, and the precepts of the Roman law were much imitated as a code for the regulation of the courts. Now, all the judges acknowledge the authority of decided cases —of the practice of the court—quite as fully as did courts of common law; and though new cases perhaps occur more frequently than they did in the courts of common law, they are dealt with as they were in courts of common law, by the application to them,

as far as possible, of accepted principles derived from the decisions of the court of chancery, or the principles of the Roman law.

The jurisdiction of equity courts was divided under three principal heads—exclusive, concurrent, and assistant. The first consists almost entirely of the administration of trusts; the second comprises questions of fraud, of account, and also, it is said (Smith's *Principles of Equity*, 217), of specific performance of agreements. This matter appears, however to fall more naturally under the assistant jurisdiction. In order to appreciate the domain of the equity courts, it must be borne in mind that common law confines its remedy usually to the awarding of damages, and to the pronouncing a judgment absolutely in favor of either plaintiff or defendant; equity, on the other hand, goes into all the merits of the case, and will deliver a modified judgment where circumstances demand it. The judges of the supreme court now all administer equity as well as law in the same manner as the court of session in Scotland had been accustomed to do from the beginning. In whichever division of the high court an action commences, that division must dispose of all the issues raised, and pursue these to final judgment. It is true one of the divisions is still called the chancery division, and actions which used to be begun in equity courts now usually begin there still. But there is a power in such division to send an issue of fact to be decided on circuit, and after trial the division resumes its jurisdiction and works it out. The chancery division consists of judges chosen from the bar generally; and the court of appeal, which sits in two divisions, consists also of judges some versed in chancery business, and some versed in common-law business. The lord chancellor since 1875 has confined his sittings to the house of lords, and occasionally to the court of appeal and to the privy council, of all of which courts he is *ex officio* a member.

EQUITY, PRINCIPLES OF, in their widest sense, are the principles of eternal justice, of which all human laws are but adaptations. "Equity," says lord Stair (i. 1, s. 17), "is the body of the law, and the statutes of men are but as the ornaments and vestiture thereof." In this sense equity coincides with the Roman precepts of law—"*honesté vivere, alterum non lædere, suum, cuique tribuere*"—(*Inst.* i. 1, s. 3), and with the principles of justice as laid down by the inspired writer—"to do justly, to love mercy, and to walk humbly with thy God"—Micah, vi. 8. As the object of human law is to give expression to these principles, equity is thus the basis of law. But it is impossible, in the nature of things, that any code of laws should provide a remedy suited to every particular case; it has, therefore, been found necessary in every civilized nation, to establish some form of authority which should control the rigor and remedy the deficiency of positive law. Thus, it is the function of the law to lay down a code of rules whereby the rights of property and the transactions of commerce shall be regulated; but by the diversities of life it happens that various circumstances will occur to cause these fixed rules to operate harshly or unjustly in particular cases. A party may complain that a contract duly entered into with all legal formalities has been obtained by fraud; the owner of an estate is incapable from infacy or lunacy of managing his affairs; a person ostensibly the owner of large property is found to be placed in possession in trust only for the benefit of others. In these and many other cases, the party who, in compliance with every rule of the law, is in possession, is not in fact the person who should in justice exercise the right. Here equity steps in. While, then, all law may be said to be equitable, inasmuch as it is the purpose of law to dispense justice, yet, in the technical sense, the term equity is confined to those cases not specially provided for by positive law. But, on the other hand, experience has shown that it would be most inconvenient, and subversive of order, if equity should arbitrarily interpose to remedy every apparent grievance, and therefore it is that the operation of equity is checked within certain limits. "There are many cases against natural justice which are left wholly to the conscience of the party, and are without any redress, equitable or legal; and so far from a court of equity supplying universally the defects of positive legislation, it is governed by the same rules of interpretation as a court of common law, and is often compelled to stop where common law stops. It is the duty of every court of justice, whether of law or of equity, to consult the intention of the legislature."—Story, *Principles of Equity*, s. 14. Hence arises the maxim, that "equity follows the law." The principles of equity, therefore, as understood in modern times, may be said to be those principles of natural justice which are permitted to modify the rigor of positive law. In applying these principles to practice, the equitable jurisdiction has been intrusted by all nations, with the exception of England (but see EQUITY COURTS), to the same courts in which the positive law was administered. In the infacy of states, the boundaries of law and equity, and the functions of the equity judge, were not so clearly defined as in the present day. By the Roman law, a power, called the *jus honorarium* or *nobile officium*, was reposed in the prætor of controlling on equitable grounds the decisions of the ordinary tribunals.* Each prætor, on entering upon his office, published an edict declaring the principles by which he would be guided in discharging his duty as an equitable magistrate. The principles so declared were binding on the prætor during his year of office, but not on his successor. There can, however, be little doubt that in process of

* This function of the prætor commenced in the earliest times under the kings of Rome, and continued to attach to the office through all the changes which distracted the nation.

time a system of equity was gradually evolved: and ultimately, in the reign of the emperor Hadrian, the edicts of the prætors were collected by a civilian named Julianus, and embodied in a single code called the perpetual edict. See EDICT. According to the practice of modern nations, the courts of law are accustomed to exercise a certain equitable jurisdiction whereby, within prescribed limits, the rules of law may be modified. In Scotland, the equitable power of the court of session is called the *nobile officium* (q.v.).

EQUITY OF REDEMPTION, the interest which a mortgager has in an estate which he has mortgaged. An E. of R. may be devised, granted, or entailed, and the course of descent to an E. of R. is governed by the same laws as the descent to the land would have been. Formerly, the equitable interest of a mortgager could not be recognized in a court of law, but by 7 Geo. II. c. 20, it is provided that where no suit is pending in a court of equity, either for foreclosure or redemption, but the mortgagee attempts to obtain possession by bringing an action of ejectment, in such a case, the court may restore his estate to the mortgager, on his payment of the principal and interest due on such mortgage.

EQUIVALENTS, in chemistry. See ATOMIC WEIGHTS.

ERA. See CHRONOLOGY.

ÉRARD, SÉBASTIEN, 1752–1831; b. Strasburg; distinguished for improvements upon the piano and the harp. He went to Paris, where the duchess of Villeroi became his patron, and in her house he made his first piano, which was one of the earliest manufactured in France. He became suddenly famous, and established a large manufactory in Paris, and during the revolution in London. Thenceforward devoting his life to the development and improvement of his favorite instrument, he brought it to a perfection before unknown.

ERASED AND ERADICATED, heraldically signifies that an object is plucked or torn off, and showing a ragged edge; as opposed to *coupe* or *coupy*, cut, which shows a smooth edge. A tree plucked up by the roots is said to be eradicated.

ERASISTRATUS, one of the most famous physicians and anatomists of ancient times, flourished in the 3d c. B.C., and is supposed to have been born at Inlis, in the island of Ceos. He resided for some time at the court of Seleucus Nicator, king of Syria, and while there acquired great renown by discovering and curing the disease of the king's eldest son, who was pining for the love of the young and beautiful Stratonice, whom his father in his old age had married. Afterwards E. lived for some time at Alexandria, where, giving up practice, he devoted himself with great energy and success to his anatomical studies. The date of his death, which seems to have taken place in Asia Minor, is not known. He founded a school of medicine, wrote several works on anatomy—in which branch he was most celebrated—on practical medicine, and pharmacy. He believed that the heart was the origin both of the veins and arteries, and, had it not been his conviction that the arteries contained *air* instead of *blood*, little doubt is entertained but that he would have anticipated Harvey in the discovery of the circulation of the blood. Of his numerous writings only some obscure fragments and titles have been preserved. Compare Hieronymus, *Erasistrati et Erasistrateorum Historia* (Jena, 1790).

ERASMUS, DESIDERIUS, one of the most vigorous promoters of the reformation, was b. at Rotterdam, 28th Oct., 1467. He was the illegitimate son of a Dutchman named Gheraerd, or Garrit, by the daughter of a physician. In accordance with the fashion among scholars of his time, he changed the name Gheraerd into its Latin and Greek equivalents Desiderius Erasmus (more correctly Erasmius)—meaning desired, loved. Till his 9th year, E. was a chorister in the cathedral at Utrecht. He was then sent to school at Deventer, where his talents began to display themselves in so brilliant a manner, that it was even then predicted that he would one day be the most learned man of his time. After the death of his parents, whom he lost at the age of 14, his guardians determined on bringing him up to a religious life, and—with the intention, it is said, of sharing his small patrimony among themselves—in his 17th year, placed him in the monastery of Emaus, near Gouda. From this constrained manner of life, however, he was released by the bishop of Cambray. After having taken priest's orders in 1492, he went to Paris, to perfect himself in theology and the humane sciences. Here he supported himself in a somewhat precarious manner, by giving private lectures, and in 1497, accompanied some Englishmen, who had been his pupils, to England, where he was well received by the king. He, however, soon returned to Paris, and in 1506, to enrich his knowledge, visited Italy. At Turin, he took the degree of D.D. Shortly after, he applied to the pope for a dispensation from his monastic vows, which was granted. During the course of his journey, he visited Venice, Parma, Rome, and other interesting cities, in company with his pupil, Alexander Stuart, a natural son of James IV. of Scotland, who, along with his father, was afterwards slain at the battle of Flodden. At Rome, the most brilliant prospects were held out to him. Cardinal Grimani, a famous lover of learning in that day, offered, out of his admiration for E., to make him "partaker of his house and fortunes." Other eminent men vied with Grimani in showing respect to the young scholar, among whom may be mentioned John de' Medici, afterwards Leo X., cardinal Raphael of St. George, and Giles of Viterbo, gen. of the Augustines. The pope (Julius II.) also offered him a place among his penitentiaries,

an office of considerable consequence, and, it would appear, a "step to the highest preferments in that court." E., who had always an eye to the main chance, regretted, at a later period of his life, that he had not accepted the offers held out to him in Rome, but meanwhile, having pledged himself to return to England, where also he had many friends, he set out for that country in 1509, after the accession of Henry VIII. In several of the cities through which he passed he met with friends and patrons, who wished him to settle amongst them, but as Henry was a correspondent of his, E. was induced to cherish the highest hopes of personal favor from that monarch, and could not be prevailed on to stay for more than a very brief period. He had no sooner, however, arrived in England than he found out his mistake. At first, he lodged with sir Thomas More, and during his stay with him composed his *Encomium Moriæ*, or Praise of Folly, the purpose of which is to expose all kinds of fools, but especially those who flourished in the church, not sparing the pope himself. For a short time he filled the office of professor of Greek at Oxford, but on the whole was very scantily supplied with the means of subsistence. In 1514, he returned disappointed to the continent, and resided chiefly at Basel, where he died, 12th July, 1536. E.'s extensive and profound learning was equaled by his refined taste and brilliant wit. A natural love of independence and quiet made him prefer a life of learned leisure and retirement to one of greater publicity; nevertheless, the readiness with which he assumed the character of an adroit man of the world, brought upon him the hostility of many of the nobler spirits of his time. He was no hero, and he knew it. He frankly confesses that "he had no inclination to die for the sake of the truth." Luther, in whom the soul and courage of the apostle Paul seemed to be revived, overwhelmed him with reproaches for his cowardice in regard to the reformation. But we must not forget that E. by his mental constitution was averse to enthusiasm. He was a scholar and a critic, not a preacher or iconoclast, and he was at least honest enough to abstain from denouncing the opinions of Luther, though he disapproved strongly of his violent language. Besides, there was a tincture of rationalism in the great Dutchman, which probably helped to chill his love of *mere Lutheranism.* But his services in the cause of science were great and lasting, and his writings are still esteemed for the importance of the subjects treated of, and their classical style. Besides editing several of the ancient authors, and various philological and theological writings, he prepared the earliest edition of the Greek Testament, which appeared at Basel in 1516. This is reckoned by some his greatest work. Michaelis says that perhaps there never existed an abler editor of the New Testament, and that E. possessed in the highest degree natural abilities, profound learning, a readiness in detecting errors, with every qualification that is requisite to produce critical sagacity. His best known work, however, is his *Colloquia*, a masterpiece. Of all his writings, this has exercised the greatest influence. The first edition appeared in 1522, but did not please E., who issued a second during the same year. A third appeared in 1524. This book, which was meant, according to Erasmus, only to make youths better Latinists and better men, was condemned by the Sorbonne, prohibited in France, and burned in Spain. No one who takes up the book will wonder at its condemnation. It contains the most virulent and satirical onslaughts on monks, cloister-life, festivals, pilgrimages, etc., but it is disfigured by lewd and unchaste passages, which are wholly inexcusable. The work has been translated into almost all the modern languages. His *Encomium Moriæ*, or Praise of Folly, has been already mentioned. It was published in the original, with a German translation, and illustrations by Holbein, by W. G. Becker (Basel, 1780). E. himself superintended an edition of his works, published by Frobenius in Basel. The most complete edition is that of Leclerc (10 vols., Leyden, 1703–6). The life of E. has been written in French by Burigny (2 vols., Paris, 1758), in German by Müller (Hamburg, 1828), and in English by Knight (Cambridge, 1726, and Drummond (2 vols., 1873).

ERASTUS, Thomas, a learned physician and theologian, was b. at Baden in Switzerland, 7th Sept., 1524. His real name was *Lieber*, which, according to the fashion of his times, he translated into Greek. In 1540, he went to the university of Basel, where he studied divinity, philosophy, and literature. He subsequently visited Italy, where he betook himself to medicine, and obtained the degree of M.D. from the university of Bologna. After an absence of nine years, he returned to his own country, and lived for some time at the court of the princes of Henneberg, where he acquired a great reputation as a medical practitioner. The elector palatine, Frederick III., now invited him to his court, and appointed him first physician and councilor of state. He also conferred on him the chair of physic in the university of Heidelberg. In 1581, he was selected to fill a similar office at Basel, where he died, Dec. 31, 1583, after establishing a liberal foundation for the provision and education of poor students in medicine, which was long called the *Erastian foundation.* Among E.'s medical works may be mentioned his *Disputationum de Medicina Nova Philippi Paracelsi* (Basel, 1572–73); *Theses de Contagio* (Heidelberg, 1574); and *De Occult. Pharmaco. Potestatibus* (Heidelberg, 1574). As a physician, E. is creditably characterized by his distrust of abstract and *à priori* theorizing, and his conviction that experimental investigation is the only road to knowledge. But his fame now rests chiefly on what he wrote in ecclesiastical controversy. In his book *De Cœna Domini*, he contended for the figurative interpretation of the passage, "This is

my body," etc., and supported this view at the conference held at Maulbron between the divines of the palatinate and those of Wittenberg. But his great work is his *Explicatio Quæstionis Gravissimæ de Excommunicatione*. Although this work was not published till some years after his death, E. had published the same opinions as it contains in the form of theses, directed against Gaspar Olevianus, a refugee from Treves, and various other persons, who were anxious to confer on ecclesiastical tribunals the power of punishing vices and misdemeanors. E. denied the right of the church to excommunicate, exclude, absolve, censure—in short, to exercise discipline. Denying "the power of the keys," he compared a pastor to a professor of any science, who can merely instruct his students; he held that the ordinances of the gospel should be open and free to all, and that penalties being both in their nature and effect *civil* and not *spiritual*, ought to be inflicted only by the civil magistrate. E. formed no *sect*, neither did he wish to do so. His desire was, in fact, of an exactly contrary character—viz., to preserve an external harmony at the expense even of the purity of the visible church. He would have let the wheat and tares grow together until the end of the world. Many eminent men, especially in the church of England, have shared similar opinions both before and after E., such as Cranmer, Redmayn, Cox, Whitgift, Lightfoot, Selden, etc. The term Erastian has long been a favorite epithet of reproach in Scotland, but has not been employed with any great precision. All persons who deny the power of an established church to alter her own laws without the consent of the state—as, for example, the law of patronage—are generally accused of *Erastianism*, although the principles of E. have literally nothing to do with such a question. An English translation of the *Explicatio* was published in 1669, and was re-edited by Dr. Robert Lee of Edinburgh in 1845.

ERA'SURE, or RAZURE, as it is more commonly called in England, from the Latin *rado*, to scrape or shave, is the scraping or shaving of a deed or other formal writing. In England, except in the case of a will, the presumption, in the absence of rebutting evidence, is that the erasure was made at or before execution.—Doe ex dem Tatham *v.* Gattamore, 17 L. T. Rep 74. "If an alteration or erasure has been made in any instrument subsequent to its execution, that fact ought to be mentioned (in the abstract, or epitome of the evidences of ownership), together with the circumstances under which it is done, and more particularly so as a fraudulent alteration by either of those means, if made by the person himself taking under it, would vitiate his interest altogether. It was formerly considered that an alteration, erasure, or interlineation (q.v.), would void the whole instrument, even in those cases where it was made by a stranger; but the law is now otherwise, as it is clearly settled that no alteration made by a stranger will prevent the contents of an instrument from retaining its original effect and operation, where it can be plainly shown what that effect and operation actually was. To accomplish this, the mutilated instrument may be given in evidence as far as its contents appear; and intrinsic evidence will be admitted to show what portions have been altered or erased, and also the words contained in such altered or erased parts; but if, for want of such evidence, or any deficiency or uncertainty arising out of it, the original contents of the instrument cannot be ascertained, then the old rule would become applicable, or, more correctly speaking, the mutilated instrument would become void for uncertainty." —Hughes's *Practice of Conveyancing*, i. 124, 125. If a will contains any alterations or erasure, the attention of the witnesses ought to be directed to the particular parts in which each alteration occur, and they ought to place their initials in the margin opposite, before the will is executed, and to notice this having been done by a memorandum, added to the attestation clause at the end of the will (*Ib.* p. 945). See also 1 Vict. c. 26. In Scotland, the rule as to erasure is somewhat stricter than in England—the legal inference being that such alterations were made after execution. As to necessary or *bona fide* alterations which may be desired by the parties, corrections of clerical errors, and the like, after the deed is written out, but before signature, the rule in Scotland is, that "the deed must show that they have been advisedly adopted by the party; and this will be effected by mentioning them in the body of the writing. Thus, if some words are erased and others superinduced, you mention that the superinduced words were written on an erasure; if words are simply delete, that fact is noticed; if words are added, it ought to be on the margin, and such additions signed by the party, with his Christian name on one side, and his surname on the other; and such marginal addition must be noticed in the body of the writ, so as to specify the page on which it occurs, the writer of it, and that it is subscribed by the attesting witnesses."—Menzies's *Lectures on Conveyancing*, p. 124. The Roman rule was, that the alterations should be made by the party himself, and a formal clause was introduced into their deeds to this effect, "*Lituras, inductiones, superinductiones, ipse feci.*" As a general rule, alterations with the pen are in all cases to be preferred to erasure; and suspicion will be most effectually removed by not obliterating the words altered so completely as to conceal the nature of the correction. "The worst kind of deletion," says lord Stair, "is when the words deleted cannot be read (but if they are scored that they can be read, it will appear whether they be *de substantialibus*), for if they cannot be read, they will be esteemed to be such, unless the contrary appear by what precedes and follows, or that there be a marginal note, bearing the deletion, from such a word to such a word, to be of consent."

E'RATH, a co. in central Texas, drained by Bosque river; 900 sq.m.; pop. '70, 1801—89 colored. The surface is rolling and tolerably fertile, but best adapted to pasturage. Co. seat, Stephensville.

ERATO, one of the nine muses, daughters of Jupiter and Mnemosyne. She presided over amatory and nuptial poetry.

ERATOS'THENES, an eminent Greek writer, called, on account of his varied erudition, the *philologist*, was b. at Cyrene 273 B.C. Among his teachers were Lysanias the grammarian, and Callimachus the poet. By Ptolemy Euergetes, he was called to Alexandria to superintend his great library. Here he died of voluntary starvation, at the age of 80, having become blind, and wearied of life. As an astronomer, E. holds an eminent rank among ancient astronomers. He measured the obliquity of the ecliptic, and the result at which he arrived—viz., that it was 23° 51′ 20″—must be reckoned a very fair observation, considering the age in which he lived. Hipparchus used it, and so did the celebrated astronomer Ptolemy. An astronomical work which goes under the name of E., but which is certainly not his, is still extant, and is called *Katasterismoi;* it contains an account of the constellations, their fabulous history, and the stars in them. It is believed, however, that E. did draw up a catalogue of the fixed stars, amounting to 675; but it is lost. A letter to Ptolemy, king of Egypt, on the duplication of the cube, is the only complete writing of his that we possess. E.'s greatest claim to distinction, however, is as a geometer. In his attempt to measure the magnitude of the earth, he introduced the method which is used at the present day, and found the circumference of the earth to be 252,000 stadia; which, according to Pliny, is 31,500 Roman miles. But as it is not known *what* stadium E. used, it is possible that he came nearer the actual circumference than the above figures indicate. His work on geography must have been of great value in his times: it was the first truly scientific treatise on the subject. E. worked up into an organic whole the scattered information regarding places and countries related in the books of travels, etc., contained in the Alexandrian library. He also wrote on moral philosophy, history, grammar, etc. His work on the Old Attic Comedy appears, from the remains we possess, to have been a learned and very judicious performance. Such fragments of E.'s writings as are still extant have been collected by Bernhardy in his *Eratosthenica* (Berlin, 1822).

ERBIUM (symbol E) is a rare metal, the compounds of which are found in a few scarce minerals, especially in *gadolinite*, obtained from Ytterby, in Sweden. In its compounds and properties it resembles the metal aluminium.

ERCILLA Y ZUÑIGA, ALONSO, a Spanish poet, was b. at Madrid, Aug. 7, 1533. He was the third son of a Spanish jurist, and at an early period became page to the infanta Don Philip, son of Charles V., accompanying him on his journey through the Netherlands, and some parts of Germany and Italy, and, in 1554, to England, on the occasion of the celebration of Philip's nuptials with queen Mary. Shortly after, E. went with the army dispatched to America to quell the insurrection of the Auracanians on the coast of Chili. The difficulties with which the Spaniards had to contend, the heroism displayed by the natives in the unequal contest, and the multitude of gallant achievements by which this war was distinguished, suggested to E. the idea of making it the subject of an epic poem. He began his poem on the spot, about the year 1558, occasionally committing his verses, in the absence of paper, to pieces of leather. An unfounded suspicion of his having plotted an insurrection involved him in a painful trial, and he had actually ascended the scaffold before his innocence was proved. Deeply wounded, the brave soldier and poet turned to Spain, but Philip treating him with coldness and neglect, E. made a tour through France, Italy, Germany, Bohemia, and Hungary. For some time he held the office of chamberlain to the emperor Rudolf II., but in 1580 returned to Madrid, where he in vain exerted himself to realize an independence. The latter years of his life were spent in obscurity and poverty at Madrid, where he died, at what period has not been ascertained. His historic epos, written in the octo-syllabic measure, and entitled *Araucana*, is, with the exception of a few episodes, a faithful description of actual events. Cervantes, in his *Don Quixote*, compares it with the best Italian epics, and it has undoubtedly not a little of the epic style and spirit. The first part is the freshest in character, having been completed before the author's return to Europe, where it was first published separately (Madrid, 1569). The second part appeared nine years later. In it E., by the introduction of episodes, yielded more to the taste of the time; and this was still more the case in the third part, which was first published, along with the two others, in 1590. In Spain, and likewise in other countries, many reprints of the poem appeared (the most elegant, 2 vols., Madrid, 1776; the most accurate, 2 vols., Madrid, 1828). A continuation was published by Don Diego Santistevan Osorio, of Leon (Salamanca, 1597). A German translation has been published by Wintering (2 vols., Nuremberg, 1831).

ERCKMANN-CHATRIAN (EMILE ERCKMANN and ALEXANDRE CHATRIAN), two French men of letters, the first of whom was born 20th May, 1822, at Phalsbourg; the second, 2d Dec., 1826, in the village of Soldatenthal, commune of Abreschwiller, both in what was then the French dep. of Meurthe, but is now reunited to Germany as part of the imperial territory of Alsace-Lorraine. Erckmann, the son of a bookseller,

went through a rather irregular course of study at the college of his native town, went to Paris in 1842 to study law, which he broke off several times, and only passed his third examination in 1857, and finally abandoned the study in the following year. During the interval, he had set himself to make a name in literature, in co-operation with M. Chatrian. The latter, belonging to an old family of glass-makers in Meurthe, ruined by reverses in trade, was acting as tutor at the college of Phalsbourg, when, in 1847, he was introduced to M. Erckmann. From that time the two friends employed their pens in the same works, which they signed with the two names united in one; and it was only about 1863 that the authors informed their readers that the numerous works of fiction, which had obtained a wide-spread popularity, and were supposed by the general public to be the work of a single writer, were the fruits of their friendly collaboration. Their early works attracted comparatively little notice; and it is said that their first work was rejected by all the newspapers of Paris, and by many provincial journals. In 1848, they published several feuilletons in the *Démocrate du Rhin*, which had just been started: *Le Sacrifice d'Abraham*, *Le Bourgmestre en Bouteille*, etc., which they have since published separately. At the same time they wrote a drama, *Le Chasseur des Ruines*, for the Ambigu-Comique, which the theater accepted, subject to changes, which they refused to make. They produced another drama, *L'Alsace en* 1814, for the theater of Strasburg, which was suppressed by the prefect on the second representation. They wrote numerous novels at this time for different journals, some of which were very little noticed, while others remained in MS. for years. Despairing of being able to live by their pens, Erckmann recommenced his law studies, and Chatrian obtained a situation in the office of the Eastern railway. It was not till 1859 that *L'Illustre Docteur Mathéus* (1859, in-18; 3d edition, 1864), published by the Librairie-Nouvelle, gave a certain éclat to the collective name of Erckmann-Chatrian. *Le Fou Yégof* (1862, in-18) is one of a series of novels, the subjects of which are taken from their national history, and gives a picture of the invasion of 1814. *Le Conscrit de* 1813 (1864) and *Waterloo* (1865) are fragments of an autobiography, and are supposed to be the recollections of a common soldier, and relate the disastrous campaigns of 1813 and 1814. These may be called the gems of their collection. *Le Joueur de Clarinette* (1863), a simple story of a village musician, and *Les Amoureux de Catherine*, another tale of village life in the same volume, are nearly perfect. *L'Homme du Peuple* appeared in 1865, and is less favorably spoken of as a work of art. It pictures the life of the modern French workman.' In 1866, appeared *La Maison Forestière*, and *La Guerre;* in 1867, *Le Blocus*, which has been translated under the title, *The Blockade of Phalsbourg;* a historical romance in 1868, *Histoire d'un Paysan;* in 1869, *Le Juif Polonais*, a play. Among their latest works are *The Story of the Plébiscite by one of the* 7,500,000 *who voted Yes* (trans. in *Cornhill Magazine*, 1871–72); and *Brigadier Frederic: a Story of an Alsatian Exile* (Eng. trans. 1875).

ERDMANN, JOHANN EDUARD, a German philosopher; b. 1805; studied theology at Dorpat, attended the lectures of Schleirmacher and Hegel, and became a pastor. In 1836, he was appointed professor of philosophy at Halle. He has published a number of works, the most important of which is an attempt to give a learned explanation of the *New Philosophy*.

ERDMANN, OTTO LINNE, 1804–69; a German chemist, educated at Dresden and the university of Leipsic; professor of chemistry at Leipsic, where he established a model laboratory. He made important discoveries in the qualities of nickel, and of indigo and other dye-stuffs. He founded a journal devoted to chemical science, and published a number of works on the subject.

ER'EBUS—the name of one of the sons of Chaos—signifies darkness, and is used specially to denote the dark and gloomy cavern beneath the earth, through which the shades pass in going to Hades.

ER'EBUS, MOUNT, and MOUNT TERROR, volcanoes discovered in 1841 in South Victoria land, in the Antarctic ocean, lat. 77½° s. The first is 12,400 ft. high; the other about 11,000 ft. When discovered, Mt. Erebus was in active eruption.

ERECHTHEUS or ERICHTHO'NIUS, and ERECHTHE'UM. Erechtheus, an Attic hero, is said to have been the son of Hephaestus and the earth, and to have been reared by Athena. One form of the tradition states that when a child he was placed by Athena in a chest, which was intrusted to Agraulos, Pandrosos, and Herse, the daughters of Cecrops, with the strict charge that it was not to be opened. Agraulos and Herse, however, unable to restrain their curiosity, opened the chest, and discovering a child entwined with serpents, they were seized with madness, and threw themselves down the most precipitous part of the Acropolis. Afterwards Erechtheus was the chief means of establishing the worship of Athena in Attica. He is regarded as the founder of the Erechtheum, the temple of Athena Polias, guardian of the city. This original Erectheum, which contained Erechtheus's tomb after his death, and which was called by his name, was burned by the Persians, but a new and magnificent temple was raised upon the same site—n. of the Parthenon, and near the northern wall of the Acropolis—in the beginning of the 4th c. B.C. The second Erechtheum was a splendid structure of the Ionic order, of an oblong shape, extending from e. to w., abutting in side chambers at the western end, towards the n. and s., and having porticoes adorned with columns at its eastern, its northern, and southern extremities. It is now a complete ruin.

ERECTION, Lords of, those of the nobility in Scotland to whom the king, after the reformation, granted lands, or tithes, which formerly belonged to the church. They were also called titulars of tithes; the gifts being by no means confined to the nobility. These titulars had the same rights to erected benefices, both in lands and tithes, which had formerly belonged to the monasteries and other religious houses. The grants were made under the burden of providing competent stipends to the reformed clergy—an obligation which was very little attended to by the grantees, prior to the decrees arbitral of Charles I., in 1629. Ersk. B. ii. tit. 10, s. 18.

ER'EGLI, or Erekli (anc. *Heraclea*), a t, and port in Asia Minor, on the Black sea, 128 m. e.n.e. of Constantinople; pop. 5,000. There is a good harbor, some ship-building, and export trade in timber, coal, silk, linen, wax, etc. The coal mines are extensive, and yield much of the supply of Constantinople. E. is the place where the 10,000 Greeks under Xenophon embarked on their return.—Another town of the same name, 55 m. n.w. of Constantinople, has a harbor on the sea of Marmora.

EREMACAUSIS (Gr. *ēremα*, gently, and *kausi*, combustion) is a term originally proposed by Liebig to indicate the slow process of combustion at ordinary temperatures, which ensues when organic compounds, such as wood, are left exposed to the air, and gradually rot away or decay. The process consists in the oxygen (O) of the air combining with the hydrogen (H) of the wood forming water (HO), and in less quantity with the carbon (C) forming carbonic acid (CO_2), leaving a brown mold or powder, called by chemists ulmin, or humus, in which carbon preponderates.

ERETRIA, a city in the island of Eubœa, founded before the war of Troy, and anciently the rival of Chalcis in commerce. It was destroyed 490 B.C., by the Persians, but was soon rebuilt, and was active in the Peloponnesian war. It was the seat of the school of philosophy established by Menedemus, a disciple of Plato. The ruins of the city are still visible.

ERFURT, a city of Prussian Saxony, anciently capital of Thuringia, stands in a highly cultivated plain, on the right bank of the Gera, 14 m. w. of Weimar. Till 1873, E. was strongly fortified, and was accounted a fortress of the second rank. Its two citadels, the Petersberg and the Cyriaksburg, were both formerly monasteries. Among the numerous churches, the cathedral and the church of St. Severus are the finest. The cathedral is one of the most venerable Gothic buildings in Germany, and possesses, besides a very rich portal, sculptures dating from the 11th to the 16th century. Of the convents, only that of the Ursuline nuns remains. The monastery of St. Augustine, famous as the residence of Luther, whose cell was destroyed by fire in 1872, was converted in the year 1820 into an asylum for deserted children. The other remarkable buildings are the university, founded in 1378, and suppressed in 1816; the royal academy; the library, containing 60,000 volumes; numerous educational establishments, infirmaries, etc. Pop. '71, 43,616; '75, 48,030. Horticulture and an extensive trade in seeds are carried on. The principal manufactures are woolen, silk, cotton, and linen goods, yarn, shoes, stockings, tobacco, leather, etc.

E. is said to have been founded in the beginning of the 5th c. by one Erpes, from whom it took its original name of Erpesford. During the middle ages, at the time of its highest prosperity, E. was strongly fortified, and contained 60,000 inhabitants. In 740, St. Boniface founded a bishopric at E., and in the year 805 it was converted into an entrepôt of commerce by Charlemagne. It afterwards belonged to the Hanse-league, then to the elector of Mainz, from 1801–6 to Prussia, and from that time until 1813 it was under French rule. E. was finally restored to Prussia by the congress of Vienna. In the spring of 1850, the parliament of the states, which had combined together for union, held its sittings at Erfurt.

ERGOT, a diseased condition of the germen of grasses, sometimes also observed in some of the *cyperaceæ*. It begins to show itself when the germen is young; different parts of the flower assume a mildewed appearance, and become covered with a white coating composed of a multitude of minute spore-like bodies mixed with delicate cob-web like filaments; a sweet fluid, at first limpid, afterwards viscid and yellowish, is exuded; the anthers and stigmas become cemented together; the ovule swells till it greatly exceeds the size of the proper seed, bursts its integuments, and becomes elongated and frequently curved, often carries on its apex a cap formed of the agglutinated anthers and stigmas, and assumes a gray, brown, purple, violet, and at length a black color, as the viscid exudation dries and hardens. The structure differs very much from that of the properly developed seed; the qualities are not less different, almost one half of the whole substance consists of *fungin;* and the cells contain, instead of starch, globules of a peculiar fixed oil—Oil of Ergot, to which the remarkable qualities of E. are supposed to be chiefly or entirely due. Oil of E. forms about 35 per cent of the E. of rye. E. appears to have been first observed in rye, in which it becomes very conspicuous from the large size it attains, sometimes an inch or even an inch and a half in length. It is, however, not uncommon in wheat and barley, although in them it is not so conspicuous, from its general resemblance to the ordinary ripened grain. Rye-grass is often affected with E., as are many other grasses; and it is of frequent occurrence in maize, in which also it attains its greatest size. E. has been supposed to be merely a

disease occasioned by wet seasons or other climatic causes. But it appears now to be fully ascertained that it is a disease occasioned by the presence of the *mycelium* of a fungus; the spores of which may perhaps be carried to the flower through the juices of the plant, for there is reason to think that E. in a field of grain may be produced by infected seed. Mr. Quekett, in 1838, described a fungus, a kind of mold (q.v.), which he found in E., and to which he gave the name of *ergotætia abortifaciens*. Link and Berkeley afterwards referred it to the genus *oidium;* and they, as well as others, believed it to be the true E. fungus. The spores of this E. mold, however, vegetate readily, under proper conditions of warmth and moisture, in situations very different from that in which E. is produced; and its presence is perhaps a consequence rather than the cause of ergot. The true E. fungus seems to have been discovered by Tulasne, who published a description of it in 1853. That of the E. of rye is called *cordiceps* (or *claviceps*) *purpurea;* its mycelium alone exists in E., but if the ergoted grains are sown, the fungus develops itself in its perfect form, growing in little tufts from the surface of the E., with stem about half an inch long, and subglobular head. Allied species appear to produce the E. of other grasses.

E. is inflammable; the fixed oil which it contains, indeed, makes it burn readily if brought into contact with the flame of a candle. It is a valuable medicine, exercising a specific action on the womb, particularly during labor, and by the greater frequency and force of the contractions which it causes when cautiously administered, often most beneficially hastening delivery. Its employment for this purpose is said to have originated—in consequence, probably, of an accidental discovery—with a provincial female practitioner in France. Its introduction into British practice dates only from 1824. It is the E. of rye which is always employed; also called SPURRED RYE, or *secale cornutum*. It has been employed also as a sedative of the circulation, to check various kinds of hemorrhage. E. is administered in various forms—powder, decoction, extract, tincture, oil of E., etc.—In large or frequent doses, E. is a poison, sometimes producing convulsions, followed by death; sometimes gangrene of the extremities, resulting in mutilation or in death.

E. of rye consists of 35 per cent of a peculiar fixed oil, 1¼ of ergotin, 46 of fungin, the remainder being gum, fat, albumen, salts, etc. E. burns with a yellow-white flame, and treated with water, yields a reddish colored liquid, with acid properties. In considerable quantities, it is a poison to the lower animals as well as to man.

ERGOTISM, the constitutional effect of ergot of rye (q.v.). See also RAPHANIA.

ERIC is the Scandinavian form of the name Henricus, Enrico, and Henry of southern nations. Many kings of the name reigned separately in Denmark and Sweden, and some ruled over the whole of Scandinavia after the union of Calmar. The memory of the two earliest rulers of the name in Denmark merits our notice from their association with the introduction of Christianity. Eric I., who died in 860, protected the Christians in the latter part of his reign, and, under the direction of the missionary Angsar or Anscharius, founded the cathedral of Ribe, the first Christian church in the land. In his time, the Northmen began those incursions into more southern countries, which were destined to exercise so permanent an influence on European history. Eric II. followed in the steps of his father, and permitted Ansgar to prosecute the labor of converting and civilizing the people, which won for him the title of the tutelar saint of the north. To Eric II. is ascribed the reorganization of those guilds which finally merged in the municipal corporations of the middle ages, but which were, at first, a mere modification of the heathen brotherhoods of the Scandinavian heroic ages, and constituted associations, whose members were a privileged class, separated by distinct laws, rights, and duties from the rest of the people. Denmark suffered in the 12th c. in an equal degree from the two Erics who ruled over her, for while Eric, surnamed Emun, exhausted the strength of the land by the indomitable pertinacity with which he endeavored, by force of arms, to compel the Vandals and other piratical neighbors to accept the Christianity which he thrust upon them, Eric "the Lamb" crippled the powers and resources of the crown by his pusillanimous subserviency to the clergy. The three Erics (Eric VI., VII., and VIII.) who occupied the throne, with only the intermission of a few years, from 1241 to 1319, are associated with one of the most disastrous periods of Danish history. Long minorities, the suicidal practice of dismembering the crown-lands in favor of younger branches of the royal house, and futile attempts to restrain the ever-increasing encroachments of the church, combined to bring the country to the brink of destruction. Eric VI. (Plogpenning) and Eric VII. (Glipping) were both assassinated, the former at the instigation of a brother, and the latter in revenge for a private injury. Eric VIII., the last of the name before the union of Calmar, died childless, and was succeeded, in 1319, by his ambitious brother Christopher, who saw himself compelled to repay his partisans at the expense of almost all the prerogatives and appanages which still belonged to the crown.

In Sweden, the first of the name who merits our notice is king Eric, surnamed the Saint, who was slain in battle in 1131, after a short reign, which was signalized, in that age of anarchy, by the foundation of many churches and monasteries, and by the promulgation of an excellent code of laws, known as *St. Eric's Lag*. This law contained provisions by which a higher status in society was secured to women, by granting

them a fixed proportion of the heritage of their male relatives, and certain definite privileges within their households. St. Eric waged frequent war with the Finns, and compelled them to adopt the outward forms of Christianity. The two namesakes and descendants of St. Eric, who ruled in Sweden during the 13th c., and Eric XII., who reigned from 1350 to 1359, have little claim to our notice, for internal disturbances and wars with their neighbors brought about the same fatal results as those which are associated with the reigns of the Erics in Denmark during the middle ages. In 1412, on the death of the great Margaret, her relative, Eric of Pomerania, succeeded to the triple crown of Scandinavia, in accordance with the articles of the famous treaty of Calmar. The noble heritage that had been bequeathed to Eric required a firmer hand and a braver spirit than his to keep it in check; and his reckless disregard of treaties and oaths, his neglect of his duties, and his misdirected ambition, led, after years of dissensions, maladministration, and disaffection, to the inevitable result that Eric was declared to have forfeited the respective thrones of the several kingdoms, which proceeded to elect rulers of their own. The intestine wars to which this condition of things gave rise, plunged the whole of Scandinavia into anarchy, and sowed seeds of dissension among the three kindred nations, which bore fatal fruits in subsequent ages. The last ten years of Eric's life were spent in the exercise of piracy in the island of Gothland, whither he had retired with his mistress and a band of followers, and from whence he sent forth piratical expeditions to pillage both friends and foes. Eric married Philippa, daughter of Henry IV. of England, whose memory is still cherished in the north, on account of the many noble deeds with which local tradition associates her name. Eric XIV., the last of the name who reigned in Sweden, had the distinction of being at once one of the worst and one of the most unhappy of the name. He succeeded, in 1560, to the throne of his father, Gustaf Vasa, who was perhaps the greatest and worthiest monarch that ever reigned over Sweden, and immediately on his accession, he made known the difference that was so unfavorably to distinguish his reign from that of his father, by quarrelling with his brothers, thwarting the nobles, and opposing the lower orders. His fickleness and extravagance were displayed in a succession of embassies, which were in turn sent to almost every European court to demand a consort for this vacillating monarch, who usually changed his mind before his envoys had time to fulfill their missions. Elizabeth of England and Mary of Scotland were more than once the objects of his matrimonial schemes; but when the resources of the country had been seriously crippled by these costly and absurd expeditions, Eric married a Swedish peasant-girl, who ultimately acquired an influence over him which was ascribed by the superstitious to witchcraft, since she alone was able to control him in the violent paroxysms of blind fury to which he was subject. It is probable that Eric labored under remittent attacks of insanity, and that to this cause may be attributed the bloodthirsty cruelty with which he persecuted those of his own relatives or attendants who fell under his suspicion. His capricious cruelties at length alienated the minds of his subjects, who, wearied with the continuous wars and disturbances in which his evil passions involved them, threw off their allegiance in 1568, and solemnly elected his brother John to the throne. For nine years, the unhappy Eric suffered every indignity at the hands of the keepers appointed by his brother to guard him, and in 1577, he was compelled to terminate his miserable existence by swallowing poison, in obedience to his brother's orders. Singular to say, this half madman was a person of cultivated understanding, and he solaced his captivity with music and the composition of psalms, and in keeping a voluminous journal.

ERIC THE RED, a native of Norway, b. about 950 A.D. He fled from Norway to escape punishment for homicide, and settled on the w. coast of Iceland. Another homicide compelled his flight from that country, and in 984 he went to Greenland, which had been discovered by Gunnbjörn 100 years before, but not settled. He gave the strange land its incongruous name to attract settlers, and became the leading man in the colony, calling the chief town Gardar. The settlements flourished for about four centuries, when they suddenly disappeared from history, and were remembered only as "the lost colonies of Greenland." It is supposed that the entire people were carried off by the plague known as the "black death," in the latter part of the 14th century. Eric is erroneously set down in some books as the discoverer of the American continent. It was his son Leif Ericsson who first landed on the continent somewhere in New England in the year 1000, and he had been preceded by Bjarne Herulfsen, who sailed along Labrador and Newfoundland in the year 986, but did not land.

ERI'CEÆ, or ERICA'CEÆ, a natural order of exogenous plants, consisting chiefly of small shrubs, but containing also some trees. The leaves are opposite or in whorls, entire, destitute of stipules, often small, generally evergreen and rigid. The flowers are sometimes solitary in the axils of the leaves, sometimes grouped in different modes of inflorescence, and are often of great beauty, in which respect no order of plants excels this; the beauty of the smallest species, and of those which have very small flowers, rivaling that of others which are trees profusely covered with magnificent clusters. About 900 species of this order are known, of which the greater number are natives of South Africa, which particularly abounds in the genus *erica*, and its allies—the true heaths (q.v.)—although some of them are also found to the utmost limits of northern vegetation. They are rare within the tropics, and only occur at considerable

elevations. Few species are found in Australia. Many of the E. are *social* plants, and a single species sometimes covers great tracts, constituting their principal vegetation. This is most strikingly exemplified in the heaths of Europe and the north of Asia. Medicinal properties exist in some of the E., as the BEARBERRY (see ARBUTUS), and the GROUND LAUREL of North America (*epigæa repens*), a popular remedy in the United States for affections of the bowels and urinary organs. Narcotic and poisonous qualities are of not unfrequent occurrence. See ANDROMEDA, AZALEA, KALMIA, LEDUM, RHODODENDRON. The berries of some species are edible (see ARBUTUS and GAULTHERIA), although none are much esteemed.—The RHODODENDREÆ have sometimes been regarded as a distinct order, but are generally considered a suborder of E., containing the genera *rhododendron*, *azalea*, *kalmia*, *ledum*, etc. The larger leaves and flowers, and generally also the larger plants of the order, belong to this suborder; which, however, contains also many small shrubs of subarctic and elevated mountainous regions.

ERICHT, or **ERROCHT**, LOCH, lies in the n.w. of Perthshire and s. of Inverness-shire, in an uninhabited district, the wildest and most inaccessible in Scotland, amid the Grampian mountains. Its banks rise steeply from the water's edge. It is 14 m. long and nearly 1 m. broad, and it extends in a s.w. direction from near Dalwhinnie on the Dunkeld and Inverness road. By one outlet it joins Loch Rannoch, and by another it runs into Loch Lydoch, its waters ultimately reaching the Tay. Its surface is about 1500 ft. above the sea, and it never freezes. In a cave at the s. end of the loch, prince Charles lay hid in 1746.

ERICSSON, JOHN, a distinguished engineer, was b. in Sweden in 1803. After serving for some time as an officer of engineers in the Swedish army, he removed in 1826 to England, and continued to occupy himself with improvements chiefly on steam machinery and its applications. It is to E. that steam navigation owes the screw-propeller (q.v.). In 1839, he went to New York, United States, where he brought out his improved caloric engine (q.v.), a hydrostatic gauge, a pyrometer, a new sea-lead, and other mechanical novelties. He constructed the iron-clad *Monitor* (see TURRET-SHIP), and other vessels for the American navy.

ERICSSON, JOHN (*ante*), 1803; b. in Sweden, where he became a distinguished engineer. He came to New York in 1839, and two years afterwards was employed on the war-steamer *Princeton* (the first war-steamer having its propelling machinery below the water-line), his own invention of the screw-propeller being used. E. soon became known for the great number and novelty of his inventions, some of which were a steam-boiler with artificial draught, which did away with smoke-stacks and effected an important saving in fuel (this invention was at once applied to railway locomotives); a steam fire-engine; the caloric engine; the screw propeller for steam navigation; a sliding telescopic chimney; machinery to check the recoil of heavy guns; an instrument for measuring distances at sea; the hydrostatic gauge for measuring the volume of fluids under pressure; a meter to measure the amount of water passing through pipes; an alarm barometer; a pyrometer to measure temperature from the freezing of water to the melting of iron; a lead to take soundings without rounding the vessel to the wind; and various modifications of his caloric engine. In the war of the rebellion he was engaged in building "monitors" (so called from the name of the first one), iron ships with revolving iron turrets for the guns. The first one was built in a little more than three months, and, Mar. 9, 1862, defeated and destroyed the confederate iron-clad *Merrimac*. Of late years he has been trying to perfect the solar engine, for which heat is obtained from the rays of the sun collected by a huge funnel lined with reflecting surface.

ERIE, one of the five great lakes which empty themselves by the St. Lawrence, separates Upper Canada on its left from Michigan, Ohio, Pennsylvania, and New York on its right. It is the most southern of the five, receiving at its south-western extremity the waters of lakes Superior, Michigan, and Huron by the river Detroit, and discharging them at its n.e. by the Niagara into lake Ontario. With a length of 240 m., E. has a breadth varying from 30 to nearly 60 m., with an area of 9,600 sq. miles. It is 16 ft. below the Huron, and 333 and 565 respectively above the Ontario and the Atlantic. At its south-western extremity are several wooded and partly cultivated islands, the largest of which is about 14 m. in circumference. It is by far the shallowest of the five great lakes. Its mean depth is stated at 120 ft.; and from this comparative shallowness and the consequent liability to a heavy ground-swell, as well as on account of the small number of good harbors, the navigation is peculiarly difficult and dangerous. The chief harbors on the s., or United States shore, besides the natural harbor of E. itself or Presque isle, are those of Cleveland, Sandusky City, and Toledo; and on the n. or Canadian shore, ports Dover, Burwell, and Stanley. Lake E. receives no rivers of any consequence. Its commercial importance, however, has been largely increased by art. It is connected by one canal with the Hudson, and by more than one with the Ohio; while, on the British side, it communicates with the Ontario by means of a still more available work, the ship-channel of the Welland. Its navigation generally closes in the beginning of Dec., and the lake remains more or less frozen till Mar. or April. The commercial importance of this lake has been greatly enhanced the last few years by the establishment of numerous lines of railway connecting its ports with the interior. The amount of traffic on the lake and on these railways is enormous. Lake E. was the scene of a

naval engagement between the British and Americans, Sept. 10, 1813, in which the latter were victorious.

ERIE, a co. in w. New York on lake Erie and Niagara river, intersected by the Erie, the New York Central, the Lake Shore, the Buffalo and Jamestown, and the Buffalo, Corry, and Pittsburg railroads, and the Erie canal; 1071 sq.m.; pop. '75, 190,570. The surface is undulating and the soil fertile, producing wheat, corn, oats, and abundant pasturage. There are beds of hydraulic cement, and good limestone. Co. seat, Buffalo.

ERIE, a co. in n. Ohio, on lake Erie, drained by Vermilion and Huron rivers, and crossed by the Lake Shore, the Cincinnati, Sandusky, and Cleveland, and the Sandusky, Mansfield, and Newark railroads; 260 sq.m.; pop. '70, 28,188. It is mostly level, producing wheat, corn, barley, butter, wool, wine, etc. Co. seat, Sandusky.

ERIE, a co. in n.w. Pennsylvania, on lake Erie between New York and Ohio; traversed by the Lake Shore, the Philadelphia and Erie, and the Erie and Pittsburg railroads; 740 sq.m.; pop. '70, 65,973. With the exception of a ridge running parallel with the lake the surface is generally level. The productions are corn, wheat, oats, butter, lumber, etc. Co. seat, Erie.

ERIE, a port on the lake of its own name in the state of Pennsylvania, stands in lat. 42° 8′ n., and long. 80° 10′ west. Its harbor, one of the largest and best on the coast, is formed by an island of 4 m. in length, which, under the appellation of Presque isle, still preserves the memory of its having been a peninsula. The belt of water, which is thus sheltered, is known as Presque isle bay, and forms a natural harbor for the city. It is now protected by a breakwater. It is 3½ m. long, and 1 m. wide, and varies in depth from 9 to 25 feet. While much has been done to improve the natural advantages of its position, E. has been connected by means of a canal with the Beaver, a feeder of the Ohio; and this work, independently of its navigable facilities, affords extensive water-power to mills of different kinds. It is the terminus of the Philadelphia and Erie railway, and is by other lines connected with New York, Cleveland, etc. This port is destined to become an important center of trade. Pop. '70, 19,646.

ERIE (*ante*), a city in Pennsylvania, on lake Erie, nearly midway between Buffalo and Cleveland. The town was laid out in 1795, was incorporated as a borough in 1805, and in 1851 chartered as a city. It is the seat of justice for Erie county. It has had a rapid increase of population—from 3,412 in 1840 to 19,646 in 1870. It stands upon an elevated bluff overlooking the lake; the streets are broad, intersecting each other at right angles; there are several parks, and the harbor is one of the best on the lake. Erie is connected by railroad with Buffalo on the e., Philadelphia on the s., and Cleveland, Detroit, etc., on the west. The manufactures of the place include steam-engines, stoves, machinery, car-wheels, bricks, leather, petroleum-refining, organs, pumps, furniture, brass-works, and brewing. The extensive coastwise trade is carried on partly by steamers and partly by sailing vessels. The harbor, protected by the island of Presque Isle and by a breakwater, has a depth of from 9 to 25 ft.; and the docks are provided with every facility for the transfer of merchandise to and from the railroads. The principal articles of shipment are lumber, coal, iron ore, and petroleum. There are several national banks, with an aggregate capital of nearly $1,000,000. The Union railway depot is a fine building, 400 ft. in length by 88 ft. in width. The schools are well organized, and there are 30 churches of different denominations. The fleet with which Perry defeated the British in the naval battle in Put-in bay, in the war of 1812–15, was built and equipped here.

ERIE, BATTLE OF LAKE, a naval engagement in the war of 1812 between Great Britain and the United States, fought in Put-in bay, near the western end of lake Erie, Sept. 10, 1813. The American fleet, which had been built at Erie, ran the British blockade on the 12th of August, and sailed west. It consisted of 9 vessels, with 54 guns and 490 officers and men. The British had 6 vessels, mounting in all 63 guns, with 502 officers and men. Only 2 vessels of the American squadron were in the proper sense vessels of war, the others having been built for trade. The American guns, though of heavier caliber, were of shorter range than those of the British; but the American fleet had an advantage in the better quality of its seamen. The American commandant was lieut. Oliver Hazard Perry. At the opening of the battle Perry's flag-ship *Lawrence* was disabled, but he left her in command of lieut. Yarnall and shifted his flag to the *Niagara* under a heavy fire. The remainder of the fleet now joined in the attack upon the enemy, compelling the almost immediate surrender of the British flag-ship *Detroit* and three other vessels. The remaining two attempted to escape, but were overtaken and captured. Perry at once sent a dispatch to gen. Harrison, saying, "We have met the enemy, and they are ours—two ships, two brigs, one schooner, and one sloop." The battle lasted 3 hours, and about 13 men were killed and wounded on each side. The American supremacy on the lakes being established, Detroit was evacuated by the British, and peace established in Michigan. Gold medals were conferred by congress upon Perry and Elliott, the leaders in the battle, and minor rewards upon the other officers and men. In 1858, on the anniversary of the battle, the remains of the officers killed were buried on Put-in bay island, where a monument has been erected to their memory.

ERIE CANAL, connecting the Hudson river at Albany and Troy with lake Erie at Buffalo, is 363 m. in length. It was begun in 1817, and completed in 1825, at a cost of $7,602,000. Its construction is due chiefly to the foresight and energy of De Witt Clinton, and while it was in progress it was often ridiculed by self-complacent skeptics as "Clinton's big ditch." The enterprise was undertaken and carried through by the state of New York, Clinton being governor during nearly all the period of its progress. As its route lay chiefly through an uninhabited wilderness, it opened for settlement an immense territory. It was subsequently enlarged, and is now 70 ft. broad at the surface, and 56 ft. at the bottom, with a depth of 7 feet. The locks, 72 in number, 57 of which are double, and 15 single, are 110 ft. long and 18 ft. wide. It is carried by great stone aqueducts across several large streams, and in some places it is cut through solid rock. It is supplied with water from lake Erie, 142 m. from Buffalo to Seneca river. Most of the flow of water is from the w. towards the e., the only exception being between Lodi and the Seneca river, where there is a fall westward through 5 locks. At Rome, a little w. of Utica, a supply of water is received from the Black river canal. Between Rome and Syracuse water is drawn from Cazenovia lake and other reservoirs, while at Syracuse it supplies water to the Oswego canal. Buffalo is 568 ft. above the level of the Hudson at Albany, the difference being overcome by locks at various points. The canal has been immensely successful, contributing largely to the growth of New York, Buffalo, and intermediate places. The railroads, though affording means of more rapid communication, and having the advantage of being open at times when the canal is frozen, have by no means superseded the latter.

ERIES, an Indian tribe of the same family as the Hurons and the Iroquois, or Six Nations, once dwelling in the neighborhood of Niagara falls, but forced inland by hostile tribes. About 1653, they were attacked by the Iroquois, and in 1656, nearly exterminated. Those who remained of the tribe became incorporated with the Senecas.

ERIE SHALE, a name given to the extension w. of the Upper Portage and Chemung rocks of New York. It overlies the Huron shale, the latter being the storehouse of petroleum.

ERIG'ENA, JOANNES SCOTUS, a famous philosopher of the middle ages, was b. probably in Ireland, and flourished during the 9th century. Very little is known regarding his history. He appears to have resided principally in France, at the court of Charles the bald. In the controversies of his time, regarding predestination and transubstantiation, he took part. His philosophic opinions were those of a Neo-Platonist rather than of a scholastic. His love for the mystic doctrines of the old Alexandrian philosophers was shown by his translation of the writings ascribed to Dionysius the Areopagite, which proved to be a wellspring of mysticism during the middle ages. E. held that God is the essential ground of all things, from whom all things emanate, and into whom they return again. Pantheism, therefore, lurks in his system. His principal work is *De Divisione Naturæ* (published by Gale, Oxford, 1681). One of its leading thoughts is the identity of philosophy and religion, when both are probably apprehended. E. uttered his opinions with great boldness, and he exhibited no less subtlety and strength of intellect in their defense. He expressed his contempt for theological dogmatism, and vindicated the authority of reason over all other authority. His words are: "Authority is derived from reason, and not reason from authority; and when the former is not confirmed by the latter, it possesses no value." Consult Hjort's *Joh. E.* (Copenh. 1823); Staudenmayer, *Joh. E.* (Frankfort, 1834); and Taillandier, *Scot. E. et la Philosophie Scholastique* (Strasb. 1843); Möller, *Scotus E.* (1844); Christlieb, *Leben und Lehre des Scotus E.* (1861); and Huber, *Johannes E.* (1861).

ERIG'ERON, a genus of plants of the natural order *compositæ*, sub-order *corymbiferæ*, having heads (flowers) of many florets, the florets of the ray numerous, in several rows, of a different color from those of the disk. Two or three species are natives of Britain, the most common of which, *E. acris*, has a stem 16 to 18 in. high, narrow entire leaves, flower-stalks forming a kind of corymb, flowers with yellow disk and pale-blue ray. It has a powerful odor, which is said to keep away fleas, and the name FLEA-BANE is sometimes given to the plant. Its ashes contain about 5 per cent of potash, for the sake of which it is sometimes collected and burned. *E. Philadelphicum*, a native of North America, with pale-purple ray, and a fetid smell, is valued in the United States as a diuretic.

ERINA'CEUS and ERINACE'ADÆ. See HEDGEHOG.

ERINNA, a Greek poetess, concerning the date of whose birth the most different statements are advanced. According to some, she was the intimate friend of Sappho (hence she is likewise called the Lesbian singer), and was born at Rhodes, or on the little island of Telos, situated w. of Rhodes; while others maintain that she lived in the age of Demosthenes; and others again, perplexed by such a wide difference in point of time, have recourse to the hypothesis of two poetesses of this name. E. acquired such celebrity by her epic, epigrammatic, and lyric poems, that her verses were compared with those of Homer, although she died at the early age of 19. The genuineness of the fragments that still exist under her name, has been disputed on good grounds. These

have been collected by Schneidewin in the *Delectus Poesis Graecæ Elegiacæ* (Göttingen, 1838). Compare Malzow, *De Erinnæ Lesbiæ vita et Reliquiis* (Petersburg, 1836).

ERIN'YES. See EUMENIDES, *ante*.

ERIOBO'TRYA. See LOQUAT.

ERIOCAULA'CEÆ, a natural order of endogenous plants, nearly allied to *restiaceæ*, and containing about 200 known species, many of which are aquatic or marsh plants. The E. are chiefly natives of the tropical parts of America and Australia. One species, *eriocaulon septangulare*, JOINTED PIPEWORT, is found in the w. of Ireland, and in some of the Hebrides; a little grass-like plant, growing in lakes which have a muddy bottom, and exhibiting small globular heads of flowers. From its botanical affinities, and with reference to geographical distribution, no British plant is more interesting. The E. form a remarkable feature of the vegetation of some parts of South America; but many of the species bear little resemblance to their humble northern congener, being almost shrubby, 4 to 6 ft. high, with leafy, much-branched stems, "each branchlet terminated by a large white ball, composed of a vast number of smaller heads, placed on peduncles of unequal length" Many of them also grow on arid mountainous regions, others in flat sandy grounds, which are flooded in the wet season.—Gardner's *Travels in Brazil*.

ERIODEN'DRON, a genus of trees of the natural order *sterculiaceæ*, natives of tropical countries, the thick woody capsules of which contain a kind of wool surrounding the seeds. These trees are therefore sometimes called WOOL-TREES. The wool of *E. samanna* is used in Brazil for stuffing pillows. *E. anfractuosum*, of which one variety, found in the East Indies, is sometimes called *E. Indicum*, and another, found in Africa, *E. guineense*, is a tree of great height, 150 ft. or more. The African variety or species is called RIMI and BENTANG. Park mentions it by the latter name. Barth says it is generally to be seen growing near the principal gate of large towns in Hansa. Its wood is soft and spongy, chiefly used for making canoes. The seeds of *E. Indicum* are eaten in Celebes. They are roundish, and of the size of peas. The trees of this genus have palmate leaves. The flowers are large and beautiful.

ERIS, in Greek mythology, sister of Mars, daughter of Nyx (night), and sister of Nemesis. Eris, or "strife," is represented at first as insignificant, but growing until her head touches the heavens. It was Eris who at the marriage festival of Peleus and Thetis flung on the table the golden apple inscribed to the fairest of the fair, for which Juno, Venus, and Minerva contended. Virgil gives Eris the name of Discordia.

ERIVAN', or IRWAN, a government of Russia on the borders of Persia, Georgia, and Armenia; 10,670 sq.m.; pop. 452,001. The largest river is the Aras, or Araxes, and Ararat is the principal mountain. There are valuable mines of gold and other minerals, and salt is produced in large quantities. Chief town, Erivan.

ERIWAN' (Persian, *Rewán*), the fortified capital of Russian Armenia, situated to the north of Ararat, in the elevated plain of Aras or Araxes, lat 40° 10' n., long. 44° 32' e., 3,312 ft. above the level of the sea. It consists of the town, properly so called, and the fortress, which is surrounded on three sides by high walls, and provided with aqueducts; a stone bridge over the Zenga, which here falls into the Araxes; a barracks, three mosques, one of which has been converted into a Russian church, the palace of the sardar, and a bazaar. Pop. '67, 14,342, who are engaged in agriculture and commerce. E. was formerly the capital of the Persian province of Aran, celebrated for its silk. In the beginning of the 16th c., the khan Rewan, at the command of Ismael, the shah of Persia, erected a strong fortress, which he called after his own name. An Armenian school was established at E. in 1629, but transferred to Ejmiadzin in 1631. During the last war between Russia and Persia, E. was stormed by the Russian gen., Paskewitsch, who received the surname of Eriwanski; and by the treaty of peace concluded at Turkmanjai, 22d Feb., 1828, it was given up by Persia to Russia, along with the province of the same name. It is now an important Russian post, as in former times it formed the bulwark of Persia against the Turks, and afterwards against Russia. In the year 1840, it was much devastated by an earthquake.

ER'LANGEN, a t. of Bavaria, is situated in the midst of a well cultivated district, on the right bank of the Regnitz, 10 m. n. of Nürnburg. It is a handsome town, and is surrounded by walls pierced by seven gates; its streets—a great number of which were erected after the year 1706, when a fire consumed a large portion of the town—are straight and regular. It is divided into the old and new towns, the latter founded in 1686 by Christian, markgraf of Bayreuth. E. is the seat of a university, of a gymnasium, of agricultural and industrial schools, and other institutions. The university, however, is the chief building. It was founded in 1742, and is celebrated as a school of Protestant theology, is attended by between 400 and 500 students, has a library containing 140,000 vols. and 1000 manuscripts, and also zoological and mineralogical collections, etc. E. owes its prosperity to the migration thither of a number of refugees from France, who were compelled to flee on the revocation of the edict of Nantes, and who introduced many new branches of manufacture at Erlangen. Besides its extensive stocking and glove manufactories, which provide the greater part of Germany with their goods, E. has great mirror and tobacco factories, and manufactures of combs

and horn-ware. E. became a Bavarian possession by the treaty of 1809. Pop. '75, 13,597.

ERLAU (Hung. *Eger*), an episcopal city of Hungary, in the co. of Heves, of which it is capital, is situated on both banks of the river Erlau, in a delightful valley skirted with vine-clad hills. It is surrounded by old walls, pierced by six gates; has four suburbs, in which the greater portion of the inhabitants dwell; and although in general its streets are narrow and have a neglected appearance, it is rich in fine public buildings. The principal of these are the lyceum, with a valuable library, and an observatory 172 ft. high; the recently built cathedral, the episcopal palace, the Franciscan and the Minorite monasteries, a richly embellished Greek church, a county hall, and the new barracks. E. has also a gymnasium, an episcopal seminary, a normal and drawing school, a hospital founded in 1730, which possesses a capital of nearly 400,000 guilders, and other important institutions. The two baths, the *Turkenbad* and the *Bischofsbad*, both of which are much resorted to during the bathing-season, are supplied from two warm springs which rise from the bank of the Erlau. The cultivation of the vine is the principal occupation of the inhabitants. The E. wine, the best red wine of Hungary, is produced in considerable quantities, and is in request even in foreign countries. There are also manufactures of linens, woolens, hats, etc., and an important weekly market, which has a beneficial effect upon the industry of the town. Pop. '69, 19,150, most of whom are Roman Catholic in religion, and Magyar in race. E. owes its importance to the very old bishopric founded here by St. Stephen in the beginning of the 11th c., and which, in 1804, was raised to an archbishopric.

ERLKÖNIG, in German, is the name applied to a poetical, personified, natural power which, according to German poetical authorities, prepares mischief and ruin for men, and especially for children, through delusive seductions. The name, not connected with the root *erle*, is synonymous with Elfen König. The E. was introduced into German poetry from the Sagas of the north, through Herder's translation of the *Erlkönig's Daughter* from the Danish, and has become universally known through Goethe's ballad of the *Erlkönig*.

ERMAN, GEORG ADOLPH, son of Paul; b. Germany, 1806. In 1828–30, he traveled around the world chiefly to make observations in magnetism, and published an account of his journey, from which the portion describing Siberia was translated into English. He has published other works on plants and animals, and since 1841 has been principal editor of a scientific publication chiefly concerning Russia. He has been for a number of years professor of physical science in the university of Berlin.

ERMAN, PAUL, 1764–1851; b. Berlin. At first intending to study for ordination in the church, he turned to pursue physical sciences and became a teacher in the French gymnasium in Berlin, and later in the military academy. When the university of Berlin was founded he was chosen professor of physics, and held the office until his death. He made important discoveries in electricity, magnetism, optics, and physiology, and wrote valuable works on these subjects.

ER'MELAND, an old division of Poland, now in the province of Konigsberg, Prussia; 1600 sq.m.; pop. about 200,000. It is a Roman Catholic diocese, with a see at Frauenburg.

ERMENONVILLE, a village in the s.e. of the department of Oise, in France, in the possession of the Girardin family. It is celebrated for its beautiful and extensive parks, and as being the resting-place of Rousseau, for which reason it is much visited in summer by strangers from Paris. It was also the residence of Gabrielle d'Estrées, the mistress of Henry IV., who inhabited a hunting-tower, part of which is still standing, and bears her name. It became still more celebrated after the death of Rousseau in 1778. During the revolution, his ashes were removed to the Pantheon, but conveyed back to E. after the restoration. It had nearly been purchased by the *Bande Noire*, but a larger sum was offered by Stanislaus de Girardin, the well-known liberal deputy, and E. was preserved for the lovers of art, of nature, and of historical monuments.

ERMINE, white fur, with black spots; the reverse of which, or a black fur with white spots, also used in heraldry, is called *contre ermine*. E. is commonly used to difference the arms of any member of a family who is connected with the law. A cross composed of four E. spots is said to be a cross ermine.

ERMINE, or STOAT, *Mustela erminea*, a species of weasel (q.v.), considerably larger than the common weasel, but much resembling it in general form and other characters, as well as in habits. The E. is almost 10 in. in length, exclusive of the tail, which is fully 4½ in. long. It is of a pale reddish-brown color in summer, the under parts yellowish-white, the tip of the tail black; in winter—in cold countries or severe seasons—the upper parts change to a yellowish-white or almost pure white, the tip of the tail, however, *always* remaining black. This change takes place more frequently in the northern than in the southern parts of Britain, but sometimes even in the s. of England; and when it is only partially accomplished, the animal presents a piebald appearance, and very often remains so during the milder winters of Britain. It is in its winter dress that it is called E., and yields a highly valued fur; more valuable, however, when obtained from the coldest northern regions than from more southern and temperate

countries. In its summer dress it is called stoat. It displays indomitable perseverance in the pursuit of its prey, which consists very much of rats, watervoles, and other such small quadrupeds; with young hares and rabbits, grouse, partridges, etc. The eggs of birds are as welcome to it as the birds themselves. The E. is a native of all the northern parts of the world. Its range extends even to the s. of Europe. It delights in moorish districts, and is tolerably abundant in the n. of Scotland. It is from Norway, Lapland, Siberia, and the Hudson's bay territories that the E. skins of commerce are obtained, which are used not only for ladies' winter garments, but for the robes of kings and nobles, and for their crowns and coronets. E. has thus obtained a distinct recognition in heraldry. In making up E. fur, the tails are inserted in a regular manner, so that their rich black shall contrast with the pure white of the rest of the fur.

ERNE, a river and lake in the s.w. of Ulster province, Ireland. The river rises in the s. of Cavan co., in the small but beautiful lough Cowna. It runs n. and n.w., merging in lough Oughter, in Cavan co., and in lough Erne in Fermanagh co., and passes Enniskillen and Ballyshannon. It then flows through the s. corner of Donegal co. into Donegal bay. It has a total course of 72 miles. On the river, at Ballyshannon is a salmon-leap fall, over a rocky ledge 20 ft. high and 150 yards broad, and the river leaps over another rocky ledge near Belleek, 2½ m. below the lower end of the loch. Lough Erne, one of the finest lochs in the kingdom, is the most attractive feature of Fermanagh co., which it bisects lengthways, and almost entirely drains. It extends 40 m. from s.e. to n.w., and consists of two lakes, the upper and lower, joined by a narrower part 10 m. long, and assuming in parts the character of a river, with Enniskillen midway between the two lakes. The upper lough is 12 by 4 m. in extent, 10 to 75 ft. deep, 151 ft. above the sea, and has 90 green hilly islets. The lower lough is 20 by 7½ m. in extent, 100 to 266 ft. deep, 148 ft. above the sea, and has 109 similar islets. On one of the islets is a round tower. They contain salmon, trout, pike, bream, and eels. The scenery around is singularly varied and beautiful.

ERNE, *Haliæëtus*, a genus of birds of the family *falconidæ*, and of the eagle group; differing from the true eagles in the greater length of the bill, in the toes and lower part of the tarsi being destitute of feathers, and generally, also, in frequenting the sea-coast and the banks of lakes and rivers to feed on fish, in feeding like vultures on carrion almost as readily as on newly killed prey, and in inferior courage. The only British species is the COMMON E. (*H. albicilla*), also known as the sea eagle or white-tailed sea eagle. It is much more common in Britain than the golden eagle, is sometimes seen even in the s. of England and in inland districts, occasionally visiting deer-parks to prey on very young fawns or to devour dead deer; but is of more frequent occurrence in the n. of Scotland, doing considerable injury to flocks in Sutherlandshire, particularly during the season of young lambs. Its favorite haunts, where it roosts and makes its nest, are the shelves and ledges of stupendous precipices on the coast, where its scream often mingles with the noise of the perpetual surge. It sometimes also breeds on crags beside inland lakes, as at the lakes of Killarney, and more rarely even on trees. Fishes are certainly its favorite food, although its mode of procuring them is not well known; but water-fowl are also its very frequent prey. It is found in most parts of Europe, and even in the islands of the Mediterranean, but is more abundant in the n. of Europe and in Siberia. It is not known as a native of America. In size, the E. is inferior to the golden eagle, being seldom more than 33 in. in its whole length. The general color of the plumage is brown, the head having a paler yellowish tinge, the tail in the adult bird is pure white. The young, sometimes called the cinereous eagle, has a grayer plumage and mottled tail.—Another notable species of this genus is the WHITE-HEADED E. (*H. leucocephalus*) of America, also called the white-headed eagle, bald eagle, and sea eagle, the chosen symbol of the United States. It is a bird of about the same size with the common E., with dark-brown plumage, and—in an adult state—the head, neck, tail, and belly white. It is found in almost all parts of North America, visiting the arctic regions in summer, but abounding chiefly in the southern states between the Atlantic and the Mississippi. It frequents both the sea-coast and the lakes and rivers, and may be often seen sailing through the column of spray at the falls of Niagara. It is very fond of fish, which it procures by wading in shallow streams, and also by compelling the osprey to relinquish prey just taken. The soaring and evolutions of the birds in the air on such occasions are described as sublime. The white-headed E. feeds also on lambs, fawns, poultry, &c.; kills swans, geese, and other water-fowl; and does not disdain to compel vultures to disgorge for its use the carrion which they have swallowed. On account of its habits and dispositions, Franklin expressed his regret that it had been chosen as the symbol of his country.—More nearly resembling the common E. is another North American species, the BIRD OF WASHINGTON (*H. Washingtonii*).—Australia produces a beautiful species (*H. leucogaster*), and numerous species are found in other parts of the world, amongst which are some of comparatively small size, as the PONDICHERRY KITE or BRAHMANY KITE (*H. ponticerianus*) of India, which is constantly to be seen fishing like a gull in the rivers of that country, and is by the Hindus considered sacred to Vishnu.

ERNST, elector of Saxony, the founder of the Ernestinian line, or the elder branch of the princely house of Saxony, was the elder son of the elector Friedrich the mild,

and of Margaret, archduchess of Austria. When only 14 years of age, he was seized and carried off from the castle of Altenburg, along with his brother Albrecht, but was speedily recaptured. This incident, known in German history as the stealing of the princes (*Prinzenraub*), has been described with extraordinary vividness by Carlyle in the *Westminster Review*, Jan., 1855. He succeeded to the electoral dignity on the death of his father in 1464, but governed in common with his brother for 21 years. In 1485, however, E. and Albrecht divided the paternal possessions, when the former obtained as his share Thuringia, the half of the district then called Osterland, with Voigtland, the Franconian estates of the house, the electoral dignity, and the dukedom of Saxony. E. was a man who took a great interest in the welfare of his people. Against injustice, tyranny, and lawlessness, he was implacable. He died at Kolditz in 1486. It is next to impossible to trace the course of the Ernestinian line through the labyrinthine mazes of the endless German genealogies; it is sufficient to say that after 1638, the Ernestinian line was represented by the dukes of Weimar, who gradually obtained the whole possessions of the house. Johann, duke of Weimar, who died in 1605, left several sons, the eldest of whom, Wilhelm, became the founder of four different branches, all of which, however, were reunited under Ernst August, duke of Weimar, who died in 1748. After 1815, the duchy of Weimar became the grand-duchy of Saxe-Weimar-Eisenach, and its present ruler is of course the direct representative of the Ernestinian line. The other three families by which it is now also represented are those of Meiningen, Saxe-Coburg-Gotha, and Altenburg.

ERNST I., surnamed the pious, duke of Saxe-Gotha and Altenburg, founder of the house of Gotha, was b. at the castle of Altenburg, 24th Dec., 1601. He was the son of that Johann, duke of Weimar, mentioned in the previous article, who died in 1605, and was thus connected with the main Ernestinian line. E. was the ninth of ten brothers, the youngest of whom was the famous Bernhard (q.v.) von Weimar. He received an excellent education from his mother, Dorothea Maria von Anhalt. After the arrival of Gustavus Adolphus in Germany, E. entered the Swedish service, and in various engagements exhibited great courage and skill, completing the victory of the Protestants at Lützen, after the fall of Gustavus. After the battle of Nördlingen, 26th Aug., 1634, E. withdrew from the theater of strife, and for the rest of his life devoted himself to restoring the prosperity of his territories, which had been frightfully devastated during the thirty years' war. He died in 1675. Of his seven sons, the eldest, Friedrich, continued the line of Gotha, while the third became the founder of the house of Meiningen, and the seventh, the founder of the house of Saalfeld. E. is a fine type of the old German Protestant prince. Zealously attached to the doctrines and government of the Lutheran church, he exercised a constant watch over its religious and educational interests. With the formalism, however, that often characterizes "strictly religious" people, he compelled his children to learn the whole Bible by heart. He was much interested in the cause of Christianity abroad, and invited to his court the abbot Gregorius from Abyssinia, besides sending thither on a religious embassy Joh. Mich. Wansleb of Erfurt. He also carried on a correspondence with the king of Ethiopia and the patriarch of Alexandria. His line became extinct by the death of Friedrich IV. in 1825.

ERNST II. (AUGUST KARL JOHANNES LEOPOLD ALEXANDER EDUARD), duke of Saxe-Coburg-Gotha, elder brother of the late prince Albert (q.v.), b. at Coburg 21st June, 1818. Both brothers received an admirable literary and scientific education. The family to which he belongs is a branch of the Ernestinian line, having been founded in 1680 by Albrecht, second son of Ernst the pious (q.v.). When E. had completed a university curriculum at Bonn, he entered the military service of the king of Saxony, but left it on the occasion of his marriage with the daughter of the grand-duke of Baden. In 1844, E. succeeded his father as duke of Saxe-Coburg-Gotha. In his opinions and aspirations, imbued with the spirit of his age, he has introduced into his little dominions many beneficial reforms, and allayed not a few long-standing jealousies. Yet one regrets to say, that his enlightened views of his duty as a ruler have not been generally appreciated by his subjects. During the stormy period of 1848–49, by spontaneous concessions on the one hand, and on the other by an energetic repression of the political anarchists, he contrived to save his territories from the perils of revolution. In the Slesvig-Holstein war, E. took a prominent part, and on the 5th April, 1849, won the battle of Eckenförde. E. was a great advocate for the unity of the German nation, and took a prominent part in most of the efforts made in that direction. His leisure hours are devoted to music and the fine arts. His operas, *Casilda*, *Santa Chiara*, and *Diana von Solanges*, are well known in Germany. In 1861, he published a pamphlet vindicating his government, and, in 1864, an account of a tour in Egypt.

ERNST, HEINRICH WILHELM, an eminent violinist, b. at Brünn, in Moravia, in 1814. He early became a pupil of the Vienna conservatorium, studying under Seyfried and Mayseder. At the age of 16, his talents excited much interest on his appearance in public at Munich, Stuttgart, and Frankfurt; and he soon afterwards performed in Paris. His first visit to London was in 1843; and he returned in subsequent years, spending the intervals in Paris and in different parts of Germany. His playing was characterized by immense brilliancy, combined with passion and sentiment. He suffered much from acute neuralgia, which latterly interfered with the exercise of his art; and the last seven

years of his life were spent at Nice, where he died Oct. 8, 1865. E.'s compositions have generally a bravura character, and include works for the violin and orchestra, quartettes, etc.

ERNEST AUGUSTUS, 1771–1851; fifth son of George III. of England. As duke of Cumberland he was for a long time a member of the house of lords, where he was an extreme tory. When his brother William IV. died, 1837, he became king of Hanover, where he became notorious for tyranny and licentiousness. His blind son George was his successor, reigning until Hanover was annexed to Prussia.

ERNESTI, JOH. AUG., the founder of a new school of theology and philosophy, was b. at Tennstädt, in Thüringia, 4th Aug., 1707. He studied at Pforta, Wittenberg, and Leipsic; but after having been appointed rector of the Thomas school in Leipsic, in 1734, turned his attention chiefly to the old classical literature, and the studies connected with it. In 1742, he became professor extraordinary of ancient literature in the university of Leipsic; in 1756, professor of rhetoric; in 1759, professor of theology; and died 11th Sept., 1781. E. paved the way to theological eminence by a thorough study of philology, and was thus led to a more correct exegesis of the Biblical authors, and to more liberal views of theology in general. In fact, it is mainly to him that we owe the proper method of theological exposition, in so far as it rests upon correct grammatical elucidation. He showed his ability as an accurate critic and grammarian, in his editions of Xenophon's *Memorabilia of Socrates;* the *Clouds* of Aristophanes, *Homer, Callimachus, Polybius, Suetonius,* and *Tacitus;* but above all, by his admirable edition of Cicero (5 vols., Leip. 1737–39), to which he added a *Clavis Ciceronia,* by way of supplement. He was also the first reviver of true and manly eloquence in Germany. His theological writings are numerous. The most remarkable are the *Initia Doctrinæ Solidioris;* the *Institutio Interpretis Novi Testamenti* (translated into English); the *Anti-Muratorius* (1755); and the *Opuscula Theologica* (1792). Compare Bauer, *Formulæ ac disciplinæ Ernestianæ indoles* (1782); Stallbaum, *Die Thomas-schule zu Leipzig* (1839).

ERŌS. See CUPID.

ERO'SION, the influence of a stream or river in hollowing out its channel. Even the smallest streams, when running over soft strata, as clay or sand, cut out channels, and remove the eroded materials. Hollows thus produced have been observed among the stratified rocks. One that occurs in the coalfield of the forest of Dean has been carefully described. The trough was found to branch, when traced in the progress of mining, over a considerable area, and to assume all the appearances of a little stream, with small tributaries falling into it. When the hollows thus abraded are of considerable extent, "*valleys of erosion*" are produced. Many of the earlier geologists held that rivers had hollowed out their own valleys. The immense amount of materials brought down by rivers, and deposited at their mouths as deltas, shows without doubt that they have contributed materially to produce inequalities on the earth's surface; but the examination of the geological structure of valleys, plainly testifies that almost every great hydrographical basin has derived its form originally from some other agency, although its outline may have been subsequently altered by the continued action of currents within it.

EROSTRATUS. See HEROSTRATUS.

EROT'IC (from the Greek *eros,* love), signifying in general whatever is marked by love or passion; but the term is chiefly applied to poetical pieces of which love is the predominating subject.

EROTOMA'NIA, a species of mental alienation caused by love. See MANIA.

ERPENIUS (Latinized from Thomas van Erpen), one of the earliest and most eminent of European orientalists, was b. at Gorkum, in Holland, 7th Sept., 1584. At an early age, he was sent to Leyden, where he directed his attention first to theology, but afterwards more particularly to the study of oriental languages. Having completed his educational course, he traveled through England, France, Italy, and Germany; and in 1613, became professor of oriental languages at Leyden. Here he erected an Arabic press in his own house, caused new types to be cut, and not only wrote but printed a great number of important works bearing on his favorite studies. The professorship of Hebrew not being vacant at the time of E.'s translation to the university of Leyden, a second Hebrew chair was founded expressly for him in 1619. Soon after this he was appointed oriental interpreter to the government, in which capacity he read and wrote replies to all official documents coming from the east. Such was the elegance and purity of his Arabic, as written at this time, that it is said to have excited the admiration of the emperor of Morocco. Towards the close of his life, tempting offers of honors and distinction came pouring in upon him from all parts of Europe; but he was never prevailed upon to leave his native country, where, in the midst of an eminent career, he died 13th Nov., 1624. Although the present standard of oriental knowledge in Europe is much in advance of that of E.'s day, there is no doubt that it was through him principally that eastern, especially Arabic studies have become what they are. With hardly any better material than a few awkwardly printed Arabic alphabets, he contrived to write his famous grammar (*Grammatica Arabica, quinque libris methodice explicata,* Leyden, 1613; recent edition by Michaelis, Gött. 1771), which for 200 years,

till the time of Silvestre de Sacy, enjoyed an undisputed supremacy; and there are many who think his *Rudimenta* unsurpassed, even at the present day, as a work for beginners. Among his other important works the best known is his *Proverbiorum Arabicorum Centuriæ Duæ* (Leyden, 1614).

ERRATA, the list of terrors with their corrections placed at the end of a book. From greater carefulness in correcting the sheets of a work in passing through the press, errors in sense or typography are now much more rare than formerly; in many instances, indeed, books are now produced without a single error which needs to be pointed out and corrected. As an example of one, for "terrors" read "errors" on first line of this article. On this subject interesting particulars are given in Disraeli's *Curiosities of Literature*, of which the following is a specimen: "Besides the ordinary *errata* which happen in printing a work, others have been purposely committed, that the *errata* may contain what is not permitted to appear in the body of the work. Wherever the inquisition had any power, particularly at Rome, it was not allowed to employ the word *fatum*, or *fata*, in any book. An author, desirous of using the latter word, adroitly invented this scheme: he had printed in his book *facta*, and in the *errata* he put, 'for *facta*, read fata.'"

ERRATICS, the name given to the water-worn blocks of stone that have been washed out of the boulder clay, or are still inclosed in it, because they have generally been derived from rocks at a distance. See BOULDERS and BOULDER-CLAY.

ERRHINES (Gr. *en*, in, and *rhin*, the nose), medicines administered locally to produce sneezing and discharge from the nostrils, in catarrh, and in various disorders of the head and eyes. Common snuff, and various other vegetable irritants in powder, have been used for this purpose.

ERROR, PROCEEDINGS IN, the form by which in England the unsuccessful party in an action at law, until the judicature acts of 1875, brought his case for consideration before a court of review. Error may be in fact or in law. If the error were in fact, the case, under the old system, was heard before the court in which the action was originally tried; if the error were in law, proceedings required to be taken before the court of exchequer chamber (q.v.). Where a party disputed the ruling of the judge, form was by bill of exceptions (q.v.) under statute of Westminster the second (13 Ed. I. c. 31). According to the former practice, it was necessary, in order to obtain a review on the ground of error, that an original writ, called a writ of error, should be issued. The writ, if the error was in fact, was styled *coram nobis*, where the case was in the queen's bench, the sovereign being presumed to preside in that court; if in the other courts, the writ was *coram vobis*. Writ of error is abolished by the judicature acts, and so is a bill of exceptions. Since 1875, all appeals are to the court of appeal by way of rehearing, and are brought by notice of motion in a summary way, and no petition or other formal proceeding other than such notice of motion is now necessary. The apellant may by the notice of motion appeal from the whole or part of any judgment, and this does not usually stay proceedings. Nearly all the judgments of the divisional courts of the high court are subject to appeal to the court of appeal and thence to the house of lords. The jurisdiction was transferred to the high court of justice in 1875, which used formerly to be vested in the common pleas at Lancaster and at Durham, and which used to be by writ of error to the queen's bench. Writs of error used formerly also to be brought on judgments of inferior courts. But since the establishment of county courts and the changes introduced by the judicature acts, the analogous proceeding is an appeal by way of a case stated for opinion of the high court, and sometimes by motion in a summary way.

ERROR, WRIT OF, in civil causes. See ERROR, PROCEEDINGS IN. *In criminal causes*, is an original writ from the high court of justice, and is in form addressed to the judges of a superior court, by which they are authorized to examine the record on which judgment was given in the inferior court, and to confirm or reverse the judgment. Writ of error formerly lay for every substantial defect appearing on the face of the record, for which the indictment might have been quashed; but by 7 Geo. IV. c. 64, it was provided that several technical defects should be cured by verdict. By 14 and 15 Vict. c. 100, every formal defect apparent on the face of the indictment must be objected to before the jury is sworn, and not after, and may then be amended. Writ of error now, therefore, lies only for defect in substance appearing on the record, as where a man having been indicted for perjury, it appears that the false statements were not made upon oath. Writ of error is not to be confounded with an appeal on the merits, which is not competent in criminal cases, the verdict being final.

ERRORS. In all observations, E. must be made. The best instruments have imperfections; and no man, however equable his temperament, can always rely on his making a proper use of his senses. As in astronomy numerical correctness in the results of instrumental measurements is of the first consequence, it is the constant care of the observer to detect and make allowance for errors. The three principal sources from which they may arise are—1st, External or incidental causes, such as fluctuations of weather, which disturb the amount of refraction; changes of temperature, affecting the form and position of instruments, etc.; 2d, *E. of observation*, being such as arise from

inexpertness, defective vision, slowness in seizing the exact instant of an occurrence, atmospheric indistinctness, etc.; and such E. as arise from slips in clamping and momentary derangements of the instrument; 3d, Instrumental defects, owing to E. in workmanship, and such as arise from the instrument not being properly placed—called E. of adjustment. The first two classes of E., so far as they cannot be reduced to known laws, vitiate the results of observations to their full extent; but being accidental, they necessarily sometimes diminish and sometimes increase them. Hence, by taking numerous observations under various circumstances, and by taking the *mean* or *average* of the results obtained, these E. may be made to destroy one another to a great extent, and so far may be subdued. With regard to the third class, it is the peculiarity of astronomical observations to be the ultimate means of detection of all defects of workmanship and adjustment in instruments, which by their minuteness elude every other mode of detection. See sir John Herschel's *Outlines of Astronomy*, s. 138 *et seq.* It may be mentioned, however, that the method of subduing E. of the first two classes by the law of average is not applicable in all cases. In certain cases, recourse must be had to what is known as the method of least squares. See SQUARES, METHOD OF LEAST; see also PROBABILITY.

ERSCH, JOHANN SAMUEL, the founder of German bibliography, was b. at Grossglogau, in Lower Silesia, 23d June, 1766; and exhibited from an early period a decided bias towards that branch of literature in which he afterwards obtained so high a reputation. At Halle, where he was sent to study theology in 1785, he devoted himself to historical investigations. After several vicissitudes, he obtained, in 1800, the office of librarian to the university of Jena. Three years later, he was called to Halle as professor of geography and statistics; and in 1808, was appointed, in addition, principal librarian. He died at Halle, 16th Jan., 1828. E. was long engaged in miscellaneous bibliographical work for other scholars; but in 1818, along with Gruber, commenced the publication at Leipsic of the *Allgemeine Encyclopädie der Wissenschaften und Künste* (Universal Encyclopædia of the Sciences and Arts), a work of immense value. By his *Handbuch der Deutschen Literatur seit der Mitte des* 18 *Jahrh. bis auf die Neueste Zeit* (Handbook of German Literature from the Middle of the 18th Century to the most recent Time, 4 vols., 1812–14), he first established modern German bibliography in the technical sense of the word; and by its completeness, accuracy, and mode of arrangement, it is undoubtedly fitted to serve as a model for the imitation of other nations.

ERSE (a corruption of *Irish*), the name given by the lowland people of Scotland to the language spoken by the inhabitants of the western highlands, as being of Irish origin. See BRETTS AND SCOTS. The proper name is Gaelic (q.v.).

ERSEK-UJVAR'. See NEUHAUSEL.

ERSKINE, Rev. EBENEZER, the founder of the secession church in Scotland, was the son of the Rev. Henry Erskine, minister of Chirnside, in Berwickshire, a descendant of the noble family of Mar, and was b. June 22, 1680. He studied at Edinburgh, and after acting for some time as tutor and chaplain in the family of the earl of Rothes, he was licensed to preach the gospel by the presbytery of Kirkcaldy in 1702. His abilities and excellent character soon brought him into notice, and in the following year he was appointed minister of Portmoak in the shire of Kinross. Here he applied himself indefatigably to the study of the Scriptures, and became so deeply convinced that to preach "Christ crucified" was his grand and constant duty as a minister, that after some time the earnestness, unction, and piety which now marked his discourses, became exceedingly attractive to the people accustomed to the chilling "legalism" which then predominated in the Scottish pulpit. E.'s popularity was not confined to the parish of Portmoak; serious Christians from all parts of the country were eager to enjoy occasionally the benefits of his ministry, and on sacramental occasions, he had frequently attendants from the distance of 60 or 70 miles. In 1731, he was translated to Stirling, after having discharged the pastoral office in Portmoak for 28 years. Previous to this event, however, the religious peculiarities of E. had brought him into unpleasant relations with some of his brethren, by the interest which he exhibited in a book called the *Marrow of Modern Divinity*, marked by its strong evangelicalism of doctrine and sentiment. After his transference to Stirling, E. distinguished himself by his advocacy of popular rights in the settlement of ministers; and ultimately involved himself in such antagonism to the church of Scotland, or at least to the ruling party in it of the time, that, along with other three clergymen, he was deposed in 1733. (For an account of the circumstances which led to these depositions, see UNITED PRESBYTERIAN CHURCH). He was shortly after joined by his brother Ralph and several other ministers. They now virtually formed a distinct sect, but they still continued to occupy their parish churches. An effort was made in 1734 to restore them to their legal connection with the church; it was unsuccessful. In 1736, E. and his friends formally seceded, but still it was not till 1740 that they were ejected from their churches. Shortly after this, a furious, and, as it seems to people now-a-days, a contemptible squabble broke out among the seceders in regard to the propriety of taking the burgess-oath. The result was a division of the sect into two bodies, the Burghers and Antiburghers. See

UNITED PRESBYTERIAN CHURCH. E. was the leader of the Burghers. He died June 22, 1756.

ERSKINE, HENRY, 1746–1817: a Scotch lawyer, brother of Thomas, lord Erskine. He was lord advocate of Scotland in 1782 and 1806. In politics he was a whig; but his fame rests chiefly on his wit and tact as an advocate.

ERSKINE, JOHN, of Carnock, and afterwards of Cardross, an eminent Scottish jurist, and professor of Scots law in the university of Edinburgh, was the son of the Hon. John Erskine of Carnock, third son of lord Cardross, whose descendants have now succeeded to the earldom of Buchan. John Erskine, the father, was a man of importance in his day, not only on account of the family to which he belonged, which even then had been prolific in historical characters, but in consequence of his personal qualities and the positions which he held. Having been forced to quit Scotland from his attachment to the Presbyterian religion, he retired to Holland, and became an officer in the service of the prince of Orange. At the revolution, he accompanied William to England, and as a reward for his services, was appointed lieutenant-governor of Stirling castle and lieut.col. of a regiment of foot. John E., the younger, born 1695, became a member of the faculty of advocates in 1719, but did not succeed as a practitioner of the law. On the death of Alexander Bain in 1737, Mr. E. was nominated to succeed him in the chair of Scots law, an office the duties of which he performed with great reputation for 28 years. For many years Mr. E. made use of sir George Mackenzie's (q.v.) *Institutions of the Law of Scotland* as his text-book; but in 1754 he published his well-known *Principles of the Law of Scotland*, which were thenceforth used for that purpose by himself and by his various successors down to the present time. On his retirement from the professorship in 1765, Mr. E. occupied himself in preparing his more important work, *The Institutes of the Laws of Scotland*, but it was not published till 1773, five years after his death. Mr. E. was twice married—first to Miss Melville, of the noble family of Leven and Melville, by whom he left the afterwards celebrated clergyman, John Erskine; and, second, to Ann, second daughter of Stirling of Keir, by whom he had four sons and two daughters. As a legal writer, Mr. E. is inferior to none of our Scottish jurists, with the single exception of lord Stair, who had the benefit of the more learned and wider judicial training of our earlier lawyers, who were educated in a continental school. In consequence of the extent to which lands changed hands in Scotland subsequent to the rebellions, feudal conveyancing became the most prominent subject of study amongst the lawyers of Mr. E.'s day, and the principles of commercial law, of which Stair laid the foundation, and which have become so important in our own time, were somewhat thrown into the shade. The labors of Mr. Bell in these departments have again brought the law of Scotland into connection with the general current of European law and mercantile practice throughout the world. But of all those departments which constitute the law of Scotland, as developed by the usages and forms of society in the country itself, there is at the present day no clearer, sounder, or more trustworthy expositor than Mr. Erskine.

ERSKINE, Rev. Dr. JOHN, son of John Erskine, of Carnock, the author of the *Institutes of the Law of Scotland*, was b. June 2, 1721, studied at the university of Edinburgh, and in 1743 was licensed to preach by the presbytery of Dunblane. In the following year, he was ordained minister of Kirkintilloch, where he remained until 1753, when he was presented to the parish of Culross, in the presbytery of Dunfermline. In 1758, he was translated to New Greyfriars church, Edinburgh; in 1766, the university of Edinburgh conferred on him the honorary degree of doctor of divinity; and in 1767, he was promoted to the collegiate charge of Old Greyfriars, where he had for his colleague Dr. Robertson. In the general assembly of the church of Scotland, he was for many years the leader of the popular or evangelical party; and there the openness and integrity of his character secured him the confidence and affection of his friends, and the esteem and respect of his opponents. Between him and principal Robertson, the leader of the moderate party, there was a courteous and honorable friendship; and the funeral sermon which he preached on the death of his colleague, did equal honor to E.'s head and heart. He died Jan. 19, 1803. E.'s writings are exceedingly numerous. They consist of essays, letters, sermons, dissertations, and pamphlets, etc., mainly of a religious character, and exhibit a superior degree of ability. Sir Walter Scott, in his *Guy Mannering*, gives a graphic and accurate description of his powers as a preacher.

ERSKINE, Rev. RALPH, brother of Ebenezer, was b. at Monilaws, in Northumberland, Mar. 18, 1685, and after completing the usual course of study incumbent on a minister, was ordained to the parish church of Dunfermline in 1711. Sympathizing with the sentiments of his brother Ebenezer, he withdrew from the judicatures of the established church in 1737. In the controversy concerning the burgess-oath, he also took part with his brother. E. died Nov. 6, 1752. His fame rests chiefly on his *Gospel Sonnets* and other religious works, which were once highly popular.

ERSKINE, THOMAS, Lord ERSKINE, was the youngest son of Henry David, tenth earl of Buchan; and was b. in Edinburgh, 10th Jan., 1750. Although his father, at the period of his birth, was reduced to an income of £200 a year, he transmitted to him the blood of a race which had been prolific in men of great ability, and had been ennobled

before the era of genuine history. The countess, who was the daughter of sir James Stewart, of Goodtrees, in the co. of Midlothian, was not only a godly Presbyterian and a skillful housewife, but a gifted and accomplished woman. After E. had attended for some time the high school of Edinburgh, the family removed to St. Andrews, at the grammar school of which place, and subsequently at the university, though never it would seem as a matriculated student, Thomas E. received the rest of such education as fell to his share. His desire was to study for a profession; but his parents, who had sent his eldest brother, lord Cardross, to Leyden, and were educating his second brother, Henry, afterwards the well-known Harry E., for the Scottish bar, could not afford the expense of a third learned education, and sent him to sea as a midshipman. In this capacity he served for four years, until the death of his father, when he purchased a commission in the first royals, and was for some time stationed at Minorca, where he employed his leisure time in the study of English literature. On his return to London, his birth, his acquirements, the elegance of his manners, and volubility of his conversation, led to his being warmly received in the best circles. It was then that he had the controversy with Dr. Johnson on the respective merits of Fielding and Richardson which Boswell has recorded; and that he published a pamphlet on the prevailing abuses in the army, which, though anonymous, was well known to be his, and obtained a great circulation. E. now grew tired of the army as a profession, in which he saw little chance of promotion; and while in this humor, an accidental interview which he had with lord Mansfield at an assize court, determined him to prosecute the study of law. E. was admitted a student of Lincoln's Inn, 26th April, 1775, and on the 13th Jan., 1776, he entered his name on the books of Trinity college, Cambridge, as a gentleman commoner. Many anecdotes are told of the privations which E. underwent when studying for the bar—how he lived on "cow-heel and tripe," dressed so shabbily as to be quite remarkable, and boasted that *out of his own family* he did not know a lord. Such stories, though probably exaggerated, proved that he endured considerable privations—considering his rank—in fitting himself for the legal profession. Lord Campbell says, that "during Easter and Trinity terms he excited a great sensation in the dining-hall by appearing with a student's black gown over the scarlet regimentals of the royals; *probably not having a decent suit of plain clothes to put on.*" Though E. was aided by his aristocratic connection, his rise was still very wonderful. Without the advantage of a business training, or what, probably even in those days, was far more important, a business connection, he rose into practice with almost unprecedented rapidity. After his first speech, the attorneys actually flocked round him with their retainers, and in telling the story, he used sometimes to bring the number which he received before quitting Westminster hall up to sixty-five! His two first clients were officers in the navy—capt. Baillie, who held an office in Greenwich hospital, against whom a rule had been obtained calling upon him to show cause why a criminal information for a libel reflecting on lord Sandwich's conduct as governor of the charity, should not be filed upon him; and admiral Keppel, who was tried by a court-martial at Portsmouth for incapacity and misconduct in an encounter with the French fleet off Ushant; and in both cases E. derived benefit from his own early connection with the service and the special information which he thus possessed. Admiral Keppel sent him two £500 notes as a fee. From this time forth, E.'s good fortune as an advocate was uninterrupted. In 1783, he was returned to parliament for Portsmouth. Four years and a half after he was called to the bar, he had cleared £8,000 to £9,000, besides paying his debts, he had got a silk gown, business of at least £3,000 a year, and a seat in parliament, and had made his brother lord advocate. In parliament, on the other hand, he failed so egregiously in his first speech as to leave scarcely any hope in the bosoms of his admirers, and what is very singular, his failure and lord Eldon's took place the same night. To some extent the phenomenon was accounted for by Sheridan's remark when he said to him: "Erskine, you are afraid of Pitt, and that is the flabby part of your character." But notwithstanding his political mortifications, his professional career went on with increasing brilliancy. In 1786, he was made attorney-general to the prince of Wales, by whom he was warmly patronized, but towards him and every one else he exhibited that manly independence which was the best part of his character. The fact of his appearing as counsel for Thomas Paine is more to his credit, than even the brave and honest speech which he made in his defense; whilst his removal in consequence from his office is, as lord Campbell has said, a lasting disgrace to those from whom the measure proceeded. Throughout the political trials which occurred in this country at that troubled period, he enacted the same manly part. When E. was proposed for the woolsack, an office far beyond his legal attainments, the king, George III., in consenting, exclaimed: "What! what! well! well!—but remember he is your chancellor, not mine." Yet his decisions as lord-chancellor, according to lord Campbell, are not so much *bad* as *superficial*, though by some equity practitioners they are spoken of as the *apocrypha*. E. was engaged in the defense of queen Caroline. He died 17th Nov., 1823.

ERSKINE, THOMAS, of Linlathen, 1788–1870; a Scotch writer on theology and religion. He was a descendant of the earl of Mar, regent of Scotland under James VI. He studied law at Edinburgh university, and, 1810, became a member of the faculty of

advocates. He retired from the bar in 1816, on succeeding to the family estate after the death of his brother. Erskine's principal works are: *Remarks on the Internal Evidence of the Truth of Revealed Religion; Essay on Faith; Unconditional Freeness of the Gospel; The Brazen Serpent; Doctrine of Election;* and *Spiritual Order and Other Papers.*

ERYN'GO, *Eryngium*, a genus of plants of the natural order *umbelliferæ*, having simple umbels, which resemble the heads of composite flowers, a leafy involucre and leafy calyx, and obovate, scaly fruit destitute both of ridges and vittæ. The species are numerous, mostly natives of the warmer temperate parts of the world, with alternate, simple, or divided leaves, which have marginal spines. One species only is common in Britain, the SEA ERYNGO, or SEA HOLLY (*E. maritimum*), which is frequent on sandy sea-shores; a very stiff, rigid, and glaucous plant. *E. campestre* has also been found in England and Ireland, but is very rare. Its root was formerly much employed in some parts of Europe as a tonic. That of *E. maritimum* is used in the same way, and possesses the same properties, being sweet and aromatic. It is sold in a candied state, and was formerly reputed stimulant, restorative, and aphrodisiac. Shakespeare makes Falstaff allude to the snowy color and supposed properties of this now almost disused sweetmeat, for the preparation of which Colchester has long been famous above all other places. E. root has also been used as an aperient and diuretic. Linnæus recommends the blanched shoots of *E. maritimum* as a substitute for asparagus. *E. fœtidum*, a native of the warm parts of America, is called fit-weed in the West Indies, a decoction of it being much used as a remedy in hysterical cases. *E. aquaticum*, a native of low wet places in North and South America, is called rattlesnake weed and button snakeroot. The root is diaphoretic and expectorant, and has a spurious reputation as a cure for the bite of a rattlesnake.

ERY'SIMUM, a genus of plants of the natural order *cruciferæ*, tribe *sisymbriæ*. The pod is four-sided. *E. cheiranthoides*, a branching annual, about 18 in. high, with lanceolate scarcely toothed leaves and small yellow flowers, is found in many parts of Europe, and also in North America. It is not uncommon in waste places and cultivated grounds in Britain, but may perhaps have been originally introduced for its medicinal use. Its seeds were formerly much employed as an anthelmintic, from which it has the name of WORM-SEED. It is also called TREACLE MUSTARD, because it was employed as an ingredient in the famous *Venice treacle*. *E. perfoliatum* is cultivated in Japan for the fixed oil of its seeds. Some of the plants formerly referred to E. are now included in other genera, as *sisymbrium* and *alliaria* (q.v.).

ERYSIP'ELAS (Gr. derivation uncertain), an inflammatory and febrile disease of the skin, attended by diffused redness and swelling of the part affected, and in the end either by desquamation or by vesication of the cuticle, or scarf-skin, in the milder forms, and by suppuration of the deeper parts in the severer varieties of the disease (phlegmonous erysipelas). E. affects, in a large proportion of instances, the face and head; it is apt to be attended with severe and typhoid fever (see FEVER), and often with great disorder of the nervous system, arising in some instances from inflammation of the membranes of the brain. In other parts of the body, severe or phlegmonous E. is apt to be succeeded by protracted and exhausting suppurations, and sometimes by diseases of the bones, or inflammations of the internal organs. E. is frequently an epidemic (q.v.) disease; it is also very apt to recur in a person who has been attacked once or oftener; and this is especially true of the form which affects the face. It is seldom that depletion is allowable in E., but the bowels should be well cleared out in most cases, and a diuretic (q.v.) given, after which the treatment consists for the most part in watching narrowly the progress of the case, keeping up the strength as well as possible, and obviating special dangers as they occur. In some cases, iron is used as a specific remedy.

ERYTHE'MA (Gr. *eruthainō*, I redden), a minor form of erysipelas (q.v.), presenting the same tendency to diffusion and redness, but not so much swelling, and little disposition towards suppuration, or even vesication. E. is chiefly dangerous when it presents itself in a wandering shape, attended with slow consuming fever. The muriated tincture of iron, in doses of twenty drops in water every hour or two, has been regarded as a specific in this disease, as well as in erysipelas. Some forms of E. are distinctly connected with constitutional diseases, as gout, rheumatism, syphilis, etc., and depend for their cure on the removal of the cause.

ERYTHRÆ'A. See CENTAURY.

ERYTHRÆ'AN SEA, in ancient geography, a name applied to an indefinite expanse of the Indian ocean, but including the Persian and Arabian gulfs. Later geographers restricted the name Erythræan to the Arabian gulf.

ERYTHRI'NA. See CORAL FLOWER.

ERYTHRO'NIUM, a genus of bulbous-rooted plants of the natural order *liliaceæ*, with drooping flowers and the segments of the perianth reflexed. *E. dens canis*, the DOG-TOOTH VIOLET, so called because of the resemblance of its little white bulbs to dogs' teeth, is a well-known ornament of our flower-borders in spring. It is a native of the

central parts of Europe and s. of Siberia. Anthelmintic properties are ascribed to the bulbs. Those of *E. Americanum* are emetic.

ERYTHROPHLÆ'UM, a genus of trees of the natural order *leguminosæ*, sub-order *mimosæ*. *E. Guineense*, a native of Guinea, is a very large tree, 100 ft. high, remarkable for the great quantity of red juice which every part of it contains, and interesting on account of the employment of this juice by the natives for an ordeal to test the innocence or guilt of a person accused of crime. The juice is swallowed in large draughts, and those who remain uninjured by it are supposed to be innocent.

ERYTHROXYLA'CEÆ, a natural order of exogenous plants, allied to the *malpighiaceæ*. They are trees or shrubs, with alternate simple leaves, stipules, flowers growing from amidst scale-like bracts, calyx of five sepals, corolla of five petals, each petal having a curious appendage—a plaited scale—at the base, 10 stamens united at the base, a three-celled ovary with two cells empty, and the third containing a single ovule, three styles, and the fruit a drupe. Nearly 100 species are known, natives of warm countries, and chiefly of tropical America. To this order belongs the coca (q.v.). The wood of some of the species is bright red; that of *erythroxylon* (Gr. red wood) *suberosum* is used in Brazil for dyeing, and a permanent red is obtained from it. That of *E. hypericifolium* is the *bois d'huile* (oil-wood) of Mauritius.

ERYX, an ancient city and mountain in the w. part of Sicily, near the sea-shore. There was once a temple to Venus on the mountain. Eryx was taken and retaken in the Carthaginian wars, and was partially destroyed by Hamilcar. The site of the old city is now occupied by a convent, and the mountain by a Moorish castle, used as a prison, around which is the modern town of San Guilano.

ERZBERG. See EISENERZ.

ERZERUM', or ERZROUM, a province embracing a large portion of Turkish Armenia, bordering on Russia and Persia, between 39° and 41° n. and 39° and 44° e.; pop. about 500,000. It is mainly a high table-land, and is traversed by several mountain ranges, between which are fertile valleys. The climate is subjected to extremes of cold and heat. The chief rivers are the Aras, or Araxes, the Euphrates, and the Kur. Chief town, Erzerum.

ERZERUM', or ERZROUM', properly *Erserum*, a strongly fortified t. in Turkish Armenia, in lat. 39° 55' n., and long. 41° 20' e., not far from the northern source of the Euphrates. It is situated in a high, but tolerably well cultivated plain; its site being 6,200 ft. above the level of the sea. The climate is cold in winter, but dry in summer. E. is the residence of an English, a Russian, and a French consul; and its pop. is estimated at 40,000, consisting of 30,000 Turks, 8,000 Armenians, and 2,000 Persians, who carry on a brisk trade, and have thus attained to a degree of prosperity unusual in the east. The copper and iron wares of E. have acquired a wide celebrity. Situated at the junction of the important highways leading from Trebizond, Transcaucasia, Persia, Kurdistan, Mesopotamia, and Anatolia, E. forms an entrepôt of commerce between Europe on the one hand, and the interior of Asia, and particularly Persia, on the other. The streets, the houses of which are built chiefly of volcanic stone cemented with mud, are narrow, crooked, and filthy; and ruins of fortifications and of buildings formerly magnificent, everywhere meet the eye. The town consists of the fortress, strictly so called, and four suburbs. The fortress, which is inclosed by a high wall, has, on the w., a citadel called Ijkaleh, with many curious monuments, and a mosque of Christian origin. The fortress also contains 15 mosques, the residence of the chief magistrate, some caravanseras, and a few elegant houses belonging to the higher order of officials and Mohammedan merchants. The suburbs boast 24 mosques, several Armenian churches, and a number of large bazaars and caravanseras. E. imports shawls, silk goods, cotton, tobacco, rice, indigo, etc.; and exports corn, sheep, and cattle, horses, mules, and gall-nuts. The principal trades carried on are tanning, dyeing morocco, and blacksmiths' and coppersmiths' work. But since Russian Transcaucasia has provided a safe trade-route to Persia, the prosperity of E. has greatly suffered. E. is a very ancient town. Its Armenian name was *Garin Khalakh*. Near it stood the old Syro-Armenian town of Arsen. When the Seljuks captured this place, the inhabitants fled to a fortress at E., which the Seljuks accordingly called *Arsen-er-Rum*, i.e., Arsen of the Romans (or Byzantines), whence the modern Erzerum. In 1201, it fell into the hands of the Seljuks; of the Mongols in 1242; and finally, in 1517, into those of the Turks. It still, however, continued to be the most important city in the country, and at the commencement of the 19th c. had a pop. of 100,000 inhabitants. In the war of 1829, between the Turks and Russians, the taking of E. by the latter decided the campaign in Asia. E. was an important military center during the war of 1877-78, and much hard fighting was done in its neighborhood. In Dec., 1877, the Russians closed round the city, already hard pressed, and reduced its defenders to the utmost distress: in Feb., 1878, it was surrendered to Russia. The Russians held it till Oct., 1878, when it was given up to the Turks.

ERZGEBIRGE ("Ore Mountains"), the name given to the chain of mountains, rich in metals, stretching in a south-westerly direction, on the confines of Saxony and Bohemia, from the valley of the Elbe to the Fichtelgebirge, in long. 12° 20' e. In the

s., it rises to a height of from 2,000 to 2,500 ft., forming a steep wall of rock; in the west, it forms broad, slaty plateaus, and gradually slopes down towards the Saxon side to the level districts of Altenburg and Leipsic. In consequence of this formation, the streams flowing southward are small, while the n. side of the chain, which is well wooded, presents a series of romantic, and occasionally fertile and thickly peopled valleys, watered by the Mulde, the Pleisse, and their numerous tributaries. The town of Gottesgabe, the site of which is the highest in Germany, is situated towards the s. of the E. range, in long. 12° 54′ e., at an elevation or 3,162 feet. The Keilberg, the highest point of the range, is 3,802 ft. above the level of the sea. The E. is chiefly of the gneiss-granite formation, in which most of the metal strata are to be found. Porphyry and basalt likewise appear.

ESARHAD'DON was the son of Sennacherib, king of Assyria. Nothing is known, positively, concerning him until his accession to the throne after the murder of his father by two other sons. The length of his reign cannot be determined, but the number of his military expeditions and the extent of his architectural works show that it must have continued many years. The order in which its principal events occurred is not known. He reigned personally at Babylon as well as Nineveh, having palaces at both cities and residing alternately in each. This fact explains and justifies the Scripture statement that Manasseh, king of Judah, when taken captive, was brought before the king of Assyria at Babylon. The monuments indicate that E. was one of the mightiest of the Assyrian kings. He conquered all Asia between the Persian gulf, the Armenian mountains, and the Mediterranean sea. On the w., his influence extended over Cilicia and Cyprus; on the e., he made war against tribes which his fathers had not known; and on the s., asserted authority over Egypt and Ethiopia. He built numerous temples that shone with silver and gold, and palaces that surpassed in magnificence those of his predecessors. The s.w. palace at Nimrud, built by him, was of extraordinary size, its great hall being 220 ft. by 100, and its porch 160 ft. by 60. It was adorned with the usual array of winged bulls, colossal sphinxes, and sculptured slabs of alabaster. When first uncovered it was apparently in a good state of preservation, but it was soon evident that fire had raged through it, splitting and calcining the alabaster slabs, which consequently crumbled to dust when exposed to the air. In his unfinished palace at Calah the slabs around the rooms were smoothed in readiness for the inscription, but when they were turned, in order to be carried away, their backs were found to be sculptured, showing that they had been taken from an older building, and that E., having consigned to oblivion the records of a former reign, was preparing to celebrate his own exploits on the reversed sides of the slabs.

E'SAU ("hairy" or "rough"), the eldest son of Isaac, and twin-brother of Jacob. As E. grew up, he became "a man of the field," a cunning hunter, and his father's favorite. He seems to have been a wild, rough, hearty Bedouin, or son of the desert, thinking nothing of to-morrow, but living with joyous carelessness from day to day. This is apparent from the manner in which he allowed Jacob to defraud him of his birthright, although it carried with it, besides many temporal advantages, the *Covenant-blessing* itself. After this transaction, E., when 40 years of age, married two Canaanitish women, "which were a grief of mind unto Isaac and to Rebekah" (Gen. xxvi. 35). Then follows the narrative of Jacob's personation of his brother, and his securing irrevocably the blessing to himself. E. now swore to kill his brother, whereupon Rebekah sent Jacob to his uncle Laban in Padanaram. E. next married his cousin Mahalath, the daughter of Ishmael; and appears to have established himself in his wife's country, to the s. of Palestine, in Mt. Seir. Here he lived probably as a predatory chief. When Jacob was returning from Padanaram, E. encountered him with 400 of his Bedouins. The meeting was a touching one. The wild borderer at least was in earnest. "Esau ran to meet him, and embraced him, and fell on his neck, and kissed him" (Gen. xxxiii. 4). His anger had long died out. E. next appears at the burial of his father Isaac, whom he seems to have loved with the warm and simple affection of a child of nature, and having obtained his share of the property, "went into the country from the face of his brother Jacob" (Gen. xxxvi. 6). From E. the region of Mt. Seir took the name of Edom (q.v.), and his posterity are generally called Edomites.

ESCALADE (Fr. from Lat. *scala*, a ladder), in siege operations, is a mode of gaining admission within the enemy's works. It consists in advancing over the glacis and covert-way; descending, if necessary, into the ditch by means of ladders; and ascending to the parapet of the curtain and bastions by the same ladders differently placed. The ladders are either procured on the spot, or are sent out with the siege-army. A convenient form is in pieces of 12 ft. length, fitting end to end by means of sockets. A firing-party is usually told off, to keep down the fire of the enemy upon the escaladers, especially a flank fire lengthwise of the ditch, which might sweep them off with terrible rapidity. The leaders of an E. constitute a "forlorn hope."

ESCAL'OP-SHELLS are often used in heraldry to signify that the bearer has made many long voyages by sea. As the Pilgrim's (q.v.) emblem, they were commonly given to those who had been to the crusades; they came to be regarded as indicating either that the bearer or his ancestor had been a crusader. The escalop-shell was the emblem of

St. James the great, and is generally met with in churches dedicated to him. The more ordinary form of the name is scallop-shell (q.v.).

ESCAMBIA, a co. in s. Alabama on the Florida border, intersected by Escambia and Conecuh rivers, and the Mobile and Montgomery railroad; 1000 sq.m.; pop. '70, 4,041—951 colored. The soil is level and sandy, and not very productive. Co. seat, Pollard.

ESCAMBIA, a co. on the extreme w. of Florida, on the gulf of Mexico between the Escambia and Perdido rivers, intersected by the Pensacola and Mobile railroad; 800 sq.m.; pop. '70, 7,817—2,880 colored. It has a level sandy soil, not very productive, and to a large extent covered with pine forests. Co. seat, Pensacola.

ESCAPE'MENT is the term applied to that part of the machinery of a watch or clock by which the onward revolving motion produced by the moving power, whether weights or spring, is brought into contact with the regulating movement of the pendulum or balance-wheel. See HOROLOGY.

ESCAPE WARRANT is a warrant issued by a judge for the apprehension of persons who have escaped from the queen's bench or fleet prisons. This power is conferred by 1 Anne, s. 2, c. 6, followed by 5 Anne, c. 9. The warrant may be issued by any judge of the court wherein the action was tried, or judgment and execution obtained, upon oath in writing, of the escape of the party, made before himself, or before one of the commissioners to take oaths. The apprehension may be effected on Sunday. The person apprehended is committed to the charge of the sheriff of the county, who is made responsible for his safe keeping.

ESCARP', in fortification, is the side or slope of the ditch next the rampart, and of the parapet itself. When the ditch of a fortress is dry, the E. is usually faced with mason-work, to render it difficult of ascent; and behind this facing (*revêtement*) there are often passages or casemates for defense. In temporary fortifications, the *revêtement* is sometimes of wood; and in field-works, palisades at the foot, or fraises on the *berme* or edge of the ditch, are held sufficient. The E. is always made at as large an angle as the nature of the soil will allow; the design being to offer the greatest possible obstacle to an assailant.

E'SCARS are large heaps of gravel, consisting chiefly of carboniferous limestone, that were accumulated during the pleistocene period. They occur in central Ireland, but are identical with the *ösar* of Sweden; and under the name of *kames*, they are not unknown in Scotland. The gravel is often heaped into narrow ridges 40 to 80 ft. high, and from 1 to 20 m. long.

ESCAUT. See SCHELDT.

ES'CHAR (Gr. *eschara*), a slough or portion of dead or disorganized tissue. The name is commonly applied to artificial sloughs produced by the application of caustics (q.v.).

ESCHAROT'IC (Gr.), causing an eschar. See CAUSTIC.

ESCHATOL'OGY, the doctrine concerning the last things, in the Christian system, treats of the millennium, the future coming of Christ, the state of man after death, the resurrection, last judgment, and final condition of mankind.

I. *The Millennium and the Future Coming of Christ.*—The xxth chapter of Revelation speaks of a period of a thousand years during which Satan shall be bound in the bottomless pit, and the souls of them who had been beheaded for the witness of Jesus and for the word of God, and who had not worshiped the beast or his image, and had not received his mark upon them, shall live and reign with Christ. This is called the first resurrection. Many persons, uniting this passage with others and professing to interpret them literally, teach that the millennium will be preceded by the second coming of Christ in visible glory, and by the resurrection of the glorified saints to reign with him on earth. Their opinion on this important point naturally colors their interpretation of a large portion of Scripture and of their practical duties as Christians. Many of them are very earnest and confident in the maintenance of their views. In opposition to them the usual faith of Christians has been that the millennium will precede the visible coming of Christ, and will be accomplished through the divine blessing, given in copious measures, on the diligent use of such means of grace as the church has always employed. They who adopt this view regard the passage in the Revelation concerning the first resurrection as figurative (as the rest of the book manifestly is), and the coming of Christ, promised in the New Testament, as: 1. An exhibition of his providential government over the history of the world and of the church. In this sense the destruction of Jerusalem by the Romans, followed by the dispersion of the Jews, Matt. xxiv. 4–28, and the establishment of the kingdom of Christ, with the gathering of his elect, 29–44, were foretold by him as a coming of the Son of Man. 2. His spiritual presence with his people during their lives and work on the earth, and at the time of their death, Matt. xviii. 20; John xiv. 23, 3. 3. His glorious appearing to judge the world, Matt. xxv. 31; I. Thes. iv. 16.

II. *The State of Man after Death.*—1. Materialists, who assert that the soul is only a function of the body say, consistently enough, that at death both perish together. 2. Pantheists, who maintain that man is a transient form of God's existence, teach that the soul has no consciousness after death. The race is immortal, but the individual

man is not. Flowers bloom from generation to generation, but each flower blooms but once, and after that exists no more. 3. Some, who are neither materialists nor pantheists, suppose that the soul cannot act or manifest itself without a bodily organism, material or other, and that consequently at death it must either cease its activity, or be furnished at once with a new body. The latter part of the alternative many of the class referred to do not hesitate to accept. "Do the dead cease to exist?" they ask, and quickly reply, "No: for there is the spiritual body as well as a natural body; at death the latter is dissolved, but the former is not affected; therefore the life of the soul, still clothed upon, remains unharmed." Those who reject this theory deny that the soul is dependent on matter for the exercise of its faculties, or for its personality, or its susceptibility. Certainly God, who is purely a spirit, is not thus dependent: and as men have a spiritual nature like that of God, the theory cannot be true concerning them. To this it is rejoined that the theory of a "spiritual body" does not require that it be any form of *matter*. 4. Many who reject or disregard the Bible, while they do not deny that the soul continues to exist after death, say they have no proof that it does. Some of this class when dying have declared that they were taking a leap in the dark. 5. The Scriptures teach the continued existence of the soul after death. The Pentateuch teaches it when it calls God the God of Abraham, Isaac, and Jacob after their death, thus implying that they still lived. The Psalms teach it when they speak of the soul as redeemed from the power of the grave, and as being satisfied when it awakes in God's likeness. The prophets teach it when they declare that the dead shall live, that they shall awake and shine as the stars forever and ever. The New Testament teaches it by the promises of Christ, "I give unto them eternal life and they shall never perish;" and by the affirmation of the apostles that Christ hath abolished death and brought life and immortality to light. 6. All who believe in a future resurrection and final judgment necessarily believe in an intermediate state of the soul after death, in some respects different both from its former condition in this life and from its final condition in the life to come. The question is, What is the nature of this intermediate state? (1) Some suppose that between death and the resurrection the soul continues in an unconscious state. Since the Bible speaks of death as a sleep, and since a dead body is as incapable of sleep as a stone, it must be (they think) the soul that sleeps. To this a sufficient answer is that in death the outward appearance of the body is exceedingly like sleep, and that it is for this reason death is compared to it; just as, on the other hand, the actual sleep of a living person has been called the "counterfeit of death." (2) The Roman Catholic church teaches that all who, dying in the peace of the church, are not perfect, pass into purgatory, concerning which they say that it is a state of suffering designed for both expiation and purification; that the duration and severity of the suffering are proportioned to the sinfulness of the sufferers; that the duration may be shortened and the severity alleviated by the prayers of the saints and the sacrifice of the mass; and that it is the prerogative of the church to remit, entirely or in part, the penalty of sins under which the soul suffers. This doctrine was not held, in its completeness, even by Roman Catholics until a comparatively late period. "Purgatory as a burning away of sins," said Dollinger at the Bonn conference of Old Catholics in 1875, "was an idea unknown, in the east as well as the west, until Gregory the great introduced it. What was thought was that after death those who were not ready for heaven were kept for some time in a state of preparation, and that the prayers of the living were an advantage to them. Gregory the great added the idea of a tormenting fire. This the schoolmen gradually converted into doctrine which they associated with papal indulgence, till it came to apply to the dead generally, which of course made all seek for indulgence. It went on to have degrees (some could receive indulgence for a few of their sins, others for all), so that eventually the pope, having already the keeping of heaven and the dominion on earth, obtained also sovereignty under the earth." (3) The general faith of Protestants is not uniform on this point; probably the prevalent view is "that the souls of believers are at their death made perfect in holiness, and do immediately pass into glory." According to this view the intermediate state of believers is one of perfect freedom from sin and suffering, and of great exaltation and blessedness. This is not inconsistent with believing that after the second coming of Christ and the resurrection the soul will be still more exalted and blessed. And with it may be mentioned, as not altogether contrary to it, the opinion of many, in both ancient and modern times, that "sheol" and "hades" are general terms for the intermediate dwelling-places of the dead, one division of which is "paradise," the happy abode of the saved; and the other "gehenna," the wretched abode of the lost.

III. *The Resurrection.*—Faith in the resurrection of the body, as additional to the future life of the spirit, rests on revelation. Swedenborgians (and some others in part agree with them) hold that man in this life has two bodies, one external and material, which dies and is buried, never to rise again; the other internal and psychical, which, incapable of death, passes in union with the soul into the invisible world as its spiritual body: the resurrection, therefore, in their view occurs at the moment of death. The Scriptures, in their obvious sense, plainly teach an actual resurrection of the dead. "All that are in the graves shall come forth." "That which is sown a natural body shall be raised a spiritual body." "The corruptible must put on incorruption, and the

mortal immortality." In some true and noble sense, the body raised will be personally representative of that deposited in the grave; for St. Paul, denying the identity of the two—"thou sowest not the body that shall be," and declaring the divine mystery—"God giveth to the seed a body as it hath pleased him," asserts the reciprocal pertinence of the two, each to each—"and to every seed his own body." Zoologists teach that with every living germ there is an immaterial principle by which one species is distinguished from another. In like manner, some suppose that as the soul is created to be incarnate, it is endowed with forces to that end; that, besides its rational, voluntary, and moral faculties, it has what may be called a vital force, which secures the formation of a body suited to its necessities and sphere. Concerning the nature of the spiritual body, nothing can now be known except what Scripture has revealed. From this source we learn that it will be an organism not of flesh and blood, but specially suited to the new state of being in which man is to live and act. Yet it is probable that it will be the glorified likeness of the human form as it existed in this life—the ideal human organism actualized.

IV. *The Final Judgment.*—The consciences of men affirm that God as the judge of all the earth must do right, and also that his moral government, as administered in this present world, does not fully render unto all according to their character and desert: "There are just men unto whom it happeneth according to the work of the wicked; and there are wicked men unto whom it happeneth according to the work of the righteous." Consequently, reason, even among the heathen, calls for a settlement of the destinies of men, so that the justice of God may be vindicated. The Scriptures declare that a final settlement will be made: "God shall bring every work into judgment, with every secret thing, whether it be good or whether it be evil." This judgment is represented as a definite future event, in which the destiny of men and of angels will be determined and manifested: "God hath appointed a day in which he will judge the world in righteousness." The word "day," while not to be taken literally, implies, it is claimed, a definite and limited period. Christ, as God manifest in human personality, and as having made atonement for the sins of mankind, will be the judge: "The Father hath given him authority to execute judgment also because he is the Son of Man." The ground of judgment will be the deeds done in the body; and the character and life of each man will be judged according to the light that he had, and (if he knew the gospel) according to the relation (determined by his own choice) which he sustains to Christ: "He that heareth my word and believeth on him that sent me hath everlasting life, and shall not come into condemnation; but is passed from death unto life."

V. *The End of the World.*—The Scriptures teach that the existing heaven and earth are to be replaced by a new creation: "They shall wax old as a garment and be changed." "The heavens shall pass away with a great noise, and the elements shall melt with fervent heat; the earth also and the works that are therein shall be burned up. Nevertheless, we, according to his promise, look for a new heavens and a new earth wherein dwelleth righteousness." "I saw a new heaven and a new earth; for the first heaven and the first earth were passed away, and there was no more sea." 2. In the Scriptures, the abode of the saved is sometimes called the better country, even the heavenly; sometimes "the city which hath the foundations;" and sometimes a "house not made with hands," as when the Savior said, "In my Father's house are many mansions, I go to prepare a place for you." 3. The blessedness of the heavenly state may be conceived of as arising, in part, from the vision of God in his glory as seen in the Lord Jesus, from the experience of his love, from the enlargement and glorification of the mental faculties, from the absence of sin and sorrow, from intercourse and fellowship with the holy and happy society of heaven, and from the possession of all good. 4. The wretchedness of the lost—of which, as to its nature or modes, little appears in the Bible, while its certainty and reality are abundantly declared—is conceived of as consisting, partly, in eternal separation from the society and influence of the good, and from fellowship with God's glory, blessedness, and love; in the presence and influence of ungodly and wicked beings; in remorse of conscience and in the power of sin in the soul. Some claim scriptural authority for conceiving of it as consisting in the ultimate and utter extinction of the personal being, sinking under sin. 5. The blessedness of the saved and the wretchedness of the lost appear in the Scriptures as without end. After much debate as to exegesis of the texts involved, the drift of the most recent critical scholarship may be said to be unmistakably towards this decision—that while the Greek language did not possess, as the Greek thought did not require, terms which necessarily carried the meaning of absolute eternity, as we now employ that word (e.g., in reference to the being of God), Christ and his apostles used, in reference to future reward and retribution, such words expressive of unlimited duration as were furnished by the language of their time; and that the whole manner and bearing of their speech on this point seems to intend an avoidance of any suggestion of an end. Especially in regard to retribution, the fact is recognized that the most decisive utterances concerning it are not from the apostles, but from Christ himself, who as the "light of the world," and the professed Savior of men, would have been quick to supply the hope of limited duration, had any such hope been within his thought. There is, however, to be noted a tendency towards statements on this point far less sweeping and dogmatic than were

formerly advanced, and a distinct enlargement of the bounds of admitted variations of belief concerning it among the denominations called evangelical.

ESCHEAT' (Fr. *echoir*, from Lat. *cadere*, to fall or happen), an incident of the feudal law whereby, when a tenant in fee-simple died, leaving no heir capable of succeeding, the land reverted to his lord. By the earlier usages, this effect took place where there was no representative of the vassal in the 7th degree, which, according to later custom, was extended to male descendants *in infinitum* (*Lib. Feud.*, i. 1, s. 4). According to the law of England, escheats are of two kinds—*propter defectum sanguinis*, and *propter delictum tenentis*. The former was in accordance with the feudal usage; so that if the owner of an estate in fee-simple dies without leaving an heir, and without having disposed of his estate by deed or will, the land reverts to the overlord, who in the present day is almost invariably the sovereign, except in copyhold estates, which E. to the lord of the manor. The most frequent instance of E. is in the case of the death of a bastard, who, having no relations but descendants, the lands on his death intestate and without issue, must revert to the crown. E. *propter delictum tenentis* is peculiar to the English law. It happened where a tenant in fee-simple had been guilty of treason or felony, in which case, not only his estate in possession, but any estate which might devolve upon him by the rules of descent, escheated to his lord; so that all who might succeed through him were cut off from the inheritance. This rule applied to all felonies, and was productive of much hardship. By modern legislation, it has been provided that attainder for felony shall not operate as a bar to inheritance, except in case of treason or murder (54 Geo. III. c. 145, 3 and 4 Will. IV. c. 106, 13 and 14 Vict. c. 60). This species of E. is to be distinguished from forfeiture of lands to the crown for treason, which prevailed in other countries besides England. See FORFEITURE.

E. in Scotland is of two kinds—1. The total forfeiture to the crown of all property heritable and movable belonging to a person who has been convicted of treason. 2. It signifies the forfeiture of goods by a debtor who has failed to make payment of debt in obedience to legal diligence (q.v.). This species of E. for debt was abolished by 20 Geo. II. c. 50. It was of two kinds: single E., and life-rent escheat. By the former, all the debtor's movables were forfeited to the crown; by the latter, the annual profits of the debtor's estate were forfeited to the superior. Single E. still exists in Scotland as a punishment of crime. In all capital convictions, it is ordered that the prisoner's "whole movable goods and gear be E. and inbrought to his majesty's use." In cases of deforcement, bigamy, perjury, and some others, single E. is imposed by statute as a portion of the penalty on conviction. Single E. also falls upon denunciation for outlawry; and if the rebel continues for a year under denunciation, his life-rent E. falls to his superior.

ESCHELLES, LES, a village in Savoy (formerly a Sardinian, now a French state), is situated on the Guier, 12 m. s.w of Chambéry. The valley beyond this village and on the road to Chambéry is blocked up by a huge limestone rock 800 ft. high, over which travelers formerly used to climb by means of ladders, and hence the name given to this village. Through this mass of limestone the public road now passes by means of a tunnel, which is 25 ft. high, of equal width, and 1000 ft. long. The tunnel was projected and commenced by Napoleon I., and finished in 1817 by the king of Sardinia.

E'SCHENBACH, WOLFRAM VON, a celebrated poet of the middle ages, was b. in the second half of the 12th c., of a noble family, which derived its name from the village of Eschenbach near Ansbach. He received the honor of knighthood at Henneberg, and passed his life in knightly fashion. In 1204, he came to the court of Hermann, landgraf of Thuringia, where he shone among the poets of the time, at the so-called Wartburg-war (a rivalry of the German minstrels held at Wartburg in 1206 or 1207). Hermann's successor, Ludwig the pious, appears to have shown E. little favor, in consequence of which he withdrew from the Thuringian court towards the close of his life. He died some time between 1219 and 1225, and was buried in his native village. E.'s poems are partly original, and partly fashioned after French and Provençal models. His rich fancy, deep sentiment, and vivid power of representation, as well as his elegant mastery of language and versification, give something of an epic character to his works, the principal of which are *Parcival*, composed before 1212, *Wilhelm von Orange*, and *Titurel*. Besides these, we have several love-songs of his. E. exercised an important influence on his time, but subsequently was almost forgotten; and it is only recently that he has been restored to his place of honor. The first critical edition of his works was that by Lachmann (Berl. 1833). They were translated into modern German by San-Marte (2 vols., Magdeb. 1836–41), and with greater accuracy, though with too slavish literalness, by Simrock (2 vols., Stuttg. 1842).

ESCH'ENMAYER, KARL ADOLF AUGUST VON, 1770–1852; b. Würtemberg; teacher of practical philosophy at the university in Tübingen, 1818–36; author of many works on philosophy, some of which were directed against the theories of Hegel and against the *Life of Jesus*, by Strauss. He carried a strong tendency to mysticism into his physical researches, and took a deep interest in the phenomena of animal magnetism, becoming at last a devout believer in demoniacal and spiritual possession.

ESCHER, Joh. Heinr. Alfred, a distinguished Swiss statesman, was b. at Zurich, 20th Feb., 1819, and studied at Bonn and Berlin. In 1842, he was created doctor of law at Zurich; and spent the two following years in Paris, devoting his attention chiefly to studies connected with Roman law. On his return to Zurich, E. became a lecturer in the high school, the subject of his lectures being chiefly the political law of the Swiss confederacy. In 1844, he was elected member of the great council of the canton, and was thus drawn into the arena of practical statesmanship. Even at that early period, his sentiments were decidedly liberal. In Jan., 1845, along with six others who shared his opinions, he published the famous summons to the popular assembly in Unterstrass for the expulsion of the Jesuits. His election into the council of the interior in 1845, and into the council of education in 1846, opened a wide field for his administrative talents in his native canton. The reorganization of the schools in the canton of Zurich, according to the demands of the time, is chiefly his work. In Dec., 1847, he became president of the great council; and in his opening speech, recommended the complete reform of the confederacy, and the greatest possible centralization. In 1848, he was sent as a deputy to the federal diet; and, along with M. Münzinger, was charged with the negotiations entered into between Switzerland and Austria, in regard to the canton of Tessin. In Dec. of the same year, E. became president of the newly elected council of regency. Since that time, his energies have been chiefly directed to education, the reorganization of church policy, and the promotion of railway enterprise and banking institutions in Switzerland. He became president of the national council in 1849, and held the post of vice-president in 1856–57, and 1861–62.

ESCHOLTZ BAY, a portion of the Arctic ocean in Alaska, U. S., forms the innermost part of Kotzebue sound, the first great inlet to the n.e. of Behring's strait. It is about long. 161° w., being barely on the outside of the polar circle. It is worthy of notice chiefly on acount of its fossil remains, which, though common on the northern coast of Siberia, are comparatively rare on that of the new continent.

ESCHSCHOLT'ZIA, a genus of plants of the natural order *papaveraceæ*, of which *E. Californica*, and other species, natives of California, have now become very common in our flower-gardens, making a showy appearance with their large deep yellow flowers. The genus is remarkable for the calyx, which separates from the dilated apex of the flower-stalk, being thrown off by the expanding flower, and much resembling in its form the extinguisher of a candle.

ESCHWEGÉ, a t. of Prussia, in the province of Hesse-Nassau, is situated on the left bank of the Werra, 25 m. e.s.e. of Cassel. It consists of an old and new town, and a suburb; is surrounded with walls pierced by six gates; and is well built. The only building of note is the castle, which was long the residence of the landgrafs of Hessen-Rotenberg. E. has manufactures of woolen and linen fabrics, numerous tanneries, and several oil and other mills, also some trade in fruit and victuals. Pop. '75, 7,724.

ESCHWEILER, a t. of Rhenish Prussia, in the circle of Aachen, and 9 m. e.n.e. from the city of Aachen (Aix-la-Chapelle), is a station on the railway between Aix-la-Chapelle and Cologne, and stands at the confluence of the Inde and Dente. It has extensive manufactures of ribbons, woolens, canvas, needles, iron-wire, and machinery, also of wax-cloth, lace, glass, vitriol, and vinegar. In the vicinity are mines of zinc and lead. Pop. '75, 15,540.

ESCOBAR' Y MENDO'ZA, Antonio, 1589–1669; a Spanish casuist descended from the illustrious house of Mendoza; educated by the Jesuits and a member of the order. He was a preacher for 50 years, delivering sometimes two sermons in a day. His principal works were on casuistry and on Scriptural commentary. His casuistry was severely criticised in the *Provincial Letters* of Pascal, and ridiculed by Boileau, Molière, and La Fontaine, and the name Escobar became a synonym in France for extreme laxity in moral principle.

ESCORT. See Convoy.

ESCU'DO DE VERA'GUA denotes at once a river and an island on the Atlantic side of Central America—the latter being at the mouth of the former. They are situated a little to the e. of the boundary between New Granada and Costa Rica. The island is in lat. 9° n., and long. 81° 30′ w.; and the river, being only 15 m. long, derives its importance, if any, from the narrowness of the belt which here separates the two oceans.

ESCU'RIAL (the correct title is El Real sitio de San Lorenzo el real de Escorial), a famous monastery of New Castile, in the province of Madrid, and situated 30 m. n.w. of the town of that name. This solitary pile of granite has been called the eighth wonder of the world, and at the time of its erection surpassed every building of the kind in size and magnificence. It owes its origin (at least, so it is said) to an inspired vow made by Philip II. during the battle of St. Quentin. On that occasion, he implored the aid of St. Lorenzo, on whose day, 10th Aug., 1557, the battle was fought; and vowed that, should victory be granted to him, he would dedicate a monastery to the saint. The E. is built in the form of a gridiron, in allusion to the instrument of St. Lorenzo's martyrdom, and forms a huge rectangular parallelogram 744 ft. from n. to s., and 580 ft. from e. to w., and divided into long courts, which indicate the interstices of the bars. Towers at each angle of this parallelogram represent the feet of the

gridiron, which is supposed to be lying upside down; and from the center of one of the sides, a range of building abuts, forming the royal residence, and representing the handle. The E. was begun in 1563, and finished in 1584, and was intended to serve as a palace, mausoleum, and monastery. It has a splendid chapel with three naves, 320 ft. long, and 320 in height to the top of the cupola. The *pantheon*, or royal tomb, is a magnificently decorated octagon chamber, 36 ft. in diameter by 38 ft. high, in the eight sides of which there are numerous black marble sarcophagi. Kings only and the mothers of kings are buried here. The E. is an immense building; it is stated that it has 14,000 doors and 11,000 windows, and its cost was 6,000,000 ducats. Its library, previous to the sack of the E. by the French in 1808, contained 30,000 printed and 4,300 MS. volumes, mainly treasures of Arabic literature, of which a catalogue, but not a good one, was drawn up by Casiri in his *Bibliotheca Arabico-Hispanica* (2 vols., Madrid, 1760–70). They were, however, at that time removed to Madrid; and on being sent back to the E., it was discovered that the library consisted only of about 20,000 volumes—a third of the whole having been lost. The French also plundered the place of its valuable collection of coins, medals, and pictures. On Oct. 2, 1872, the E. was struck by lightning, and partially burned. The E. is saved from going to ruin by grants of public money, which are occasionally made.

ESCUTCHEON, in heraldry, is synonymous with shield (q.v.).

ESCUTCHEON OF PRETENSE, or INESCUTCHEON, is a small shield placed in the center of the larger one, and covering a portion of the charges on the latter, in which a man carries the arms of his wife when she is the heiress of her family. It is said to be carried *surtout*, or over-all. Sometimes also a shield over-all is given as a reward of honor; thus, the earl of Stirling did bear two coats quarterly, and over all an inescutcheon of Nova Scotia, because he was the first planter of it.—*Mackenzie, Heraldry*, p. 82.

ESDRAËLON, a great plain in Palestine, separating the mountain ranges of Galilee from those of Samaria. It forms a triangle between Nazareth in the n., a pass opening toward Akka in the w., and Jenin, the ancient Euganium, in the south. The watershed extending from Nazareth to Jenin, about 15 m., may be considered the base of the triangle, and divides the lands drained by the Jordan from those watered by the Kishon. The Galilean hills, forming the n. boundary of the plain, extend from Nazareth w. 12 m., and there draw near the Carmel range, forming a narrow pass by which the Kishon finds egress toward the sea. The Carmel, or Samaria, range extends from this pass s.e. 18 m. to Jenin. The e. boundary rises at times into high hills, the most important of which is Mt. Gilboa. The plain is sometimes called the valley of Jezreel. This plain of E. has in all history been a battle-field. It was the scene of important battles between the Israelites and their enemies, among them the triumph of Barak and the defeat of Saul and Josiah. Here the Egyptians and the Assyrian hosts met in repeated struggles, and in later times it appears in the wars of Napoleon. In the sublime imagery of the book of the Revelation, this plain appears as the scene of the last great struggle between the powers of good and evil.

ESDRAS, BOOKS OF. The word *Esdras* is the Greek form of Ezra, and indicates that the books so named do not exist in Hebrew or Chaldee. In the Vulgate, the first book of Esdras means the canonical book of Ezra; and the second, the canonical book of Nehemiah; whilst the third and fourth are what we call the first and second books of Esdras. But in the Vatican and other editions of the LXX., what we call the first book of Esdras comes first, and is followed by the canonical book of Ezra, which is termed the *second* book of Esdras. In all the earlier editions of the English Bible the order of the Vulgate is followed. The Geneva Bible was the first to adopt the classification now used, according to which Ezra and Nehemiah give their names to two canonical books, and the two apocryphal become first and second Esdras. As regards the *first* book of Esdras, it is for the most part a transcript—and not a very accurate one—of Ezra and a portion of Nehemiah, together with the two last chapters of 2d Chronicles. It is impossible to ascertain anything regarding its age or authorship. Josephus quotes it extensively in his Antiquities, even when it contradicts *Ezra* proper, a fact which indicates that it was highly valued by the Jews. It may perhaps be interesting to notice that the hackneyed phrase, *Magna est veritas et prevalebit* (truth is great, and will prevail), is taken from the 41st verse of the 4th chapter of this book. The *second* book of Esdras, or Revelation of Esdras, is wholly different in character from the first, and it has even been doubted whether it is the work of a Jewish or of a semi-Christian writer. Lawrence and Hilgenfeld argue for its being composed 28–25 B.C.; Lücke, shortly after the death of Cæsar (44 B.C.); while Gfrörer, Bauer, and Wieseler assign it to a period as late as the reign of Domitian (81–96 A.D.). The opinion which has the weightiest evidence in its favor is, that the book was originally the composition of a Jew, but that it has been largely interpolated by Christian writers. The book was probably written in Egypt, and forms part of what has been called the "Apocalyptic Cycle" of Jewish literature (see REVELATION OF ST. JOHN). It consists of a series of angelic visions and revelations made to Ezra, regarding the mysteries of the moral world, and the final triumph of the righteous, who, however, are to be but "a very few." The descriptions are occasionally very striking, and even sublime, and if the doctrinal portions

contain the original views of a man living before the apostolic era, the source of the Pauline phraseology can in part be discovered.

ESENBECK'IA, a genus of trees of the natural order *diosmaceæ*. The bark of *E. febrifuga* is said to be equal in its effects to Peruvian bark. It is a tree 40 ft. high, a native of the s. of Brazil.

ESK (Gaelic, *uisg*, water), the name of several small Scotch rivers. The Dumfriesshire Esk is formed by the confluence of the Black and White Esk, which rise on the borders of Selkirkshire, near Ettrick Pen, the center of the southern Highlands, and run each 10 m. s.s.e. The united stream runs 35 m. s., and forms for a mile the boundary between Scotland and England. For the last 8 m. it runs s.s.w. in Cumberland, and finally falls into the head of the Solway firth. It flows in a Silurian, carboniferous, and Permian basin, through some charming scenery, past Langholm, Canobie, and Longton. The upper part of the valley of this E., which is wild and pastoral, is called Eskdale Muir.—The Edinburghshire North and South Esk rise in the n. of Peeblesshire, between the Pentland and Moorfoot hills, and both run n.n.e. through a beautiful tract in the e. of Edinburghshire, the n. branch, 20 m. long, passing Roslin and Hawthornden and the s. branch 15 m. long. The two branches unite in Dalkeith park, and run 3 m. n. into the firth of Forth at Musselburgh. The basin of the two streams is chiefly carboniferous.—The Forfarshire North and South Esk. The North Esk rises in the Grampians, in the n. of the county, and runs 25 m. s.e. into the sea, 4 m. n. of Montrose. At Ganachy bridge it runs half a mile through a sandstone gorge 20 to 30 ft. deep. In the lower half of its course it divides Forfarshire from Kincardineshire. The South E. rises in the Grampians of the w. of Forfarshire, and runs 40 m. s.e. and e., crossing the valley of Strathmore. It passes Brechin, and ends in the tidal basin or lagoon of Montrose. The basins of both consist of gneiss, mica-slate, clay-slate, and old red sandstone.

ESKAR, a term applied in Ireland to certain objects in the superficial drift, which occur in several parts of that country, and are not unknown in Scotland, but which are more abundant in Sweden than in any other known country, being there recognized as *ösar*. An *eskar* is generally a long linear ridge of rounded gravel, including pieces of considerable size; in Sweden they often have rough erratic blocks deposited upon them. It is an unsettled point whether they are connected with glacial action; if connected with it, the whole appearances and consistency demonstrate at least subsequent marine action. There is a remarkable E. on a moor spreading below Dirrington Law, in Berwickshire (900 ft. above the sea); another about a mile long, has been pointed out amidst a vast alluvial accumulation at St. Fort, Fifeshire.

ESKI-DJUM'NA, a t. of the principality of Bulgaria, is situated 20 m. w. of Shumla. Lat. 43° 15′ n., long. 26° 35′ east. Estimated pop. about 10,000.

ESKI-SA'GRA, a t. of European Turkey, in the province of eastern Roumelia, is situated at the southern base of the Balkan mountains, 70 m. n.w. of Adrianople. In the vicinity are numerous gardens and orchards, and also several mineral springs, which are in great repute. The manufactures are carpets, coarse linens, and leather. Pop. 15,000 to 20,000.

ESLA, a river of Spain, and an important affluent to the Douro, rises in the province of Palencia, Old Castile, from the southern base of the Asturias mountains, 10 m. n.w. of the town of Valleburon. Throughout the whole of its course, it flows s.w., and joins the Douro 15 m. below the town of Zamora. It is 125 m. in length. Its waters, which are joined by numerous streams, are well stocked with fish.

ESMERALDA, a co. in s.w. Nevada, on the California border, intersected by Walker river, and containing Walker lake, a large body of water having no known outlet; 7,850 sq.m.; pop. '75, 1288. There are gold and silver mines, but little agriculture, the land, where not mountainous, being arid plains. Co. seat, Aurora. The great salt basin, in this county, is covered with pure salt, and is 16 m. long and 3 m. wide.

ESMERALDAS (signifying *emerald* in Spanish) denotes a river, a town, and a province, all in the state of Ecuador (q.v.) in South America.—1. The river rises near the city of Quito, and enters the Pacific after a course of 110 m., in lat. 1° 5′ n., and long. 79° 40′ w.—2. The town stands 10 m. from the mouth of the river, containing about 4,000 inhabitants.—3. The province, watered by the above-mentioned river, occupies the n.w. of Ecuador. It is mostly covered with forests, but produces excellent cacao and tobacco. Pop. 8,000 to 10,000.

ES'NÉ, ESNA, or ESNEH, the hieroglyphic *Sen*, and the Greek *Latopolis* or *Latônpolis*—the city of the latus fish or *latus nobilis*, from the fish there worshiped—is a thriving but badly built town of Upper Egypt, and is situated on the left bank of the Nile, in lat. 25° 15′ north. It contains about 12,000 inhabitants, many of whom are Copts, and has some manufactories of fine cotton, shawls, and pottery. It is an entrepôt for the Sennaar caravans. There are famous ruins at E., which consist of a sandstone temple, with a portico of four rows of six columns, which appears to have been founded by Thothmes III., whose name is seen on the jambs of a door. The temple, however, seems to have been restored or principally constructed by Ptolemy Eurgetes (246–222 B.C.), and the pronaos was erected in the reign of the emperor Claudius (41–54 A.D.), and completed

in that of Vespasian. The interior is of the date of Trajan, the Antonines, and Geta, whose name, erased or replaced by that of Caracalla, is there found. The great temple was dedicated to Chnumis, Satis, and Har-Hek. It has a zodiac like that of Dendera, formerly thought to be of the most remote antiquity, but now known to be no older than the Romans. A smaller temple with a zodiac, erected in the reign of Ptolemy Eurgetes, formerly stood at E'Deyr, 2½ m. n. of E., but it has been destroyed. At E. is also a stone quay, bearing the names of M. Aurelius. This city was the capital of a nome, and the coins struck in it in the reign of Hadrian, 127–28 A.D., represent the fish latus.—Champollion, *Not. Descr.* p. 283; Wilkinson, *Mod. Egypt*, ii. p. 268; Tochon d'Annecy, *Médailles.*

ESO'CIDÆ, a family of malacopterous fishes, which is now regarded as including only the pikes (q.v.), but in which the flying fishes (*exocoetus*) and other fishes, now constituting the family *scomberesocidæ* (q.v.), and of the order *pharyngognaths*, were until recently included.

ESOP. See ÆSOP, *ante.*

ESOTER'IC (Gr.) is a term derived from the ancient mysteries, in which it was applied to those doctrines that were designed for the initiated, in contradistinction to those that were imparted to the uninitiated, which were termed *exoteric.* It is now used in various relations of an analogous kind.

ESPALIER, a term borrowed from the French, and signifying a railing on which fruit-trees are trained as on a wall. Such railings are very variously constructed—sometimes of wood, sometimes of iron, sometimes of upright rails held together by a horizontal rail at top, sometimes chiefly of horizontal rails with upright posts for their support. Espaliers may be very conveniently and cheaply made of strong iron wire, sustained by upright iron or wooden posts, as in ordinary wire fences. They vary in height from 4 to about 8 ft., according to situation and the size of the garden. They have the advantage of securing the fruit in a great measure from the effect of winds, which often shake off great part of the crop of standard trees whilst still unripe: and from the full exposure to sun and air, excellent fruit is produced, although there is no reflected heat as from a wall, which is therefore still superior. Espaliers are very common in gardens in Britain, and add at once to the beauty and the productiveness of a garden, the ground not being overshadowed as by standard trees, although, of course, the roots of the trees render it unsuitable for many crops to some distance on both sides of the espalier. Espaliers are often used to separate flower-borders from plots occupied by culinary vegetables. Apples and pears are considered more suitable for espaliers than any other kinds of fruit trees commonly cultivated in Britain. The treatment is generally similar to that of wall trees, but the training is usually by horizontal branches. It is not unusual, when trees have become old and their branches thick and firm, to dispense with great part of the rails necessary in their earlier training.

ESPARTE'RO, JOAQUIN BALDOMERO, ex-regent of Spain, count of Luchana, duke of Vittoria, etc., was b. in the year 1792, at Granatula, in La Mancha (Ciudad Real), where his father, Antonio Espartero, followed the occupation of a cartwright. E. was intended for the ecclesiastical profession, and in 1806 went to the university of Almagro, but two years later, on the invasion of Spain by the French, he entered the sacred battalion (*batallon sagrado*), so called from being composed almost entirely of students. After the close of the war of independence in 1814, he went to South America, where he fought against the insurgents; but after the victory gained by Bolivar at Ayacucho, Dec. 9, 1824, had put an end to the Spanish rule on the continent of America, E. returned to Spain. In 1832, he declared himself openly in favor of the succession of the daughter of Ferdinand VII.; and on the breaking out of the civil war after the king's death, he soon rose to the rank of lieut.gen. In Aug., 1836, he succeeded in saving the city of Madrid, and became successively gen.-in-chief of the army in the n., viceroy of Navarre, and capt.gen. of the Basque provinces. When the army of Don Carlos appeared before Madrid on the 12th Sept., 1837, E. had again the glory of saving the capital. His successful campaign of 1839, which resulted in the expulsion of Don Carlos from Spain, procured him the title of grandee of Spain, and duque de la Vittoria y de Morella. In 1840, the queen-mother, Christina, was compelled to resign her office of regent, and on the 8th of May, 1841, E. was appointed by the Cortes to supply her place until the queen (Isabella) should have reached her majority. E. guided the helm of the state with energy, firmness, and ability; but in 1843 an unscrupulous and unprincipled combination of parties naturally inimical to each other, the republicans and the moderados, brought about his fall. E. sailed for England, where he resided for four years. In 1847, he returned to Spain, and lived quietly at Logroño till 1854, when the wretched despotism and profligacy with which the name of Christina is associated, caused an insurrection of the people, and compelled the queen-mother to leave the kingdom. E. was again called to the head of the government, and conducted the affairs of the nation for two years; but in July, 1856, he was supplanted by gen. O'Donnell. In 1857, he resigned his dignity as senator, and after that time rarely took part in politics. After the revolution of 1868, which resulted in the expulsion of queen Isabella, E. gave his full and hearty adhesion to the provisional government, though he

took no part in their proceedings. In 1870, E. was induced to become a candidate for the throne of Spain; but withdrew in June of the same year, alleging his age and the division of parties as excuse. In 1875, he adhered to king Alfonso. He died in Jan., 1879.

ESPAR'TO, *Stipa* or *Macrochloa tenacissima*, a grass nearly allied to the well-known and beautiful feather-grass (q.v.), a native of the s. of Europe, and particularly abundant in some parts of Spain. It is much used by the Spaniards for making sandals, nets, sacks, etc.; and has become an important material in paper-making.

ESPE'JO, a small t. of Spain, in the province of Cordova, and 20 m. s.e. of the town of that name, is situated on the slope of a hill. It is comparatively well built, with wide and regular streets. It has an ancient castle of the duke of Modena Celi. E. has some manufactures of linen and woolen goods, and some trade in grain, cattle, and wool. Pop. 5,284.

ESPINASSE, JULIE JEANNE ELEONORE DE L', one of the most fascinating women of her time, and one who combined sparkling gifts with a heart susceptible of the strongest affections, was b. at Lyons, 19th Nov., 1732, and was the illegitimate daughter of a Mme. d'Albion. After the death of her mother, Mlle. de l'E., who had received an excellent education, went to live at the house of her brother-in-law, the marquis de Vichy-Chamroud, in whose family she held the position of *gouvernante*. In 1752, she left her brother-in-law's house, and went to Paris in the quality of *demoiselle de compagnie* to the marquise Du Deffand (q.v.). The two ladies lived together for a time most agreeably, until it became evident that the charms of the young and beautiful *demoiselle* had enlisted on her side the admiration of the circle in which Du Deffand had formerly been the chief attraction. Even D'Alembert, the famous encyclopédist, who hitherto had been the most constant admirer of Du Deffand, now manifested an entire devotion to the younger and more fascinating Espinasse. A rupture between the ladies was the consequence. The friends of E., however, obtained for her, through the duc de Choiseul, an annuity from the king. It is said that D'Alembert sought her hand in vain. She died 23d May, 1776. Her *Lettres*, etc. (Paris, 1809), bear witness to her remarkable cultivation.

ESPINEL, VINCENT DE, a Spanish poet and musician, was b. at Ronda in Granada, 28th Dec., 1551. He studied at Salamanca, afterwards entered into the army, and traveled as a soldier through a great part of Spain, France, and Italy, meeting with the adventures which he relates in his *Relaciones de la Vida y Aventuras del Escudero Marcos de Obregon* (Madr. 1618, later 1804; in German, by Tieck, Bres. 1827). He afterwards returned to his native country, entered into holy orders, and received a benefice in Ronda, his native town. He was subsequently chaplain in the royal hospital at Ronda. The last years of his life were spent at Madrid, in the retirement of the monastery of *Santa Catalina*, where he died in 1634. He published a book of poems (Madr. 1591), containing chiefly lyrics, and a translation of the *Epistola ad Pisones*, the *Ars Poetica* of Horace. He was, if not the inventor, the improver of the ten-line octosyllabic stanza. Verses written in this form have, since E.'s day, been called in Spain *Espinelas*. He was a performer on the guitar, to which he added the fifth string.

ESPINHA'CO (SERRA DO), a mountain-chain of Brazil, extends in a direction generally parallel with the coast, from the right bank of the San Francisco to the head-waters of the Uruguay. Its northern part forms the eastern limit of the basin of the former river. The Serra, as a whole, is said to be rich in diamonds.

ESPIR'ITU SANTO, besides having been long applied by the Spaniards to their imaginary continent in the southern hemisphere, denotes various actual localities.—1. E. S. is a small maritime province of Brazil, extending in s. lat. from 18° 30′ to 21° 20′, and lying immediately to the n. of the metropolitan province of Rio Janeiro. This province contains also a town and a bay of its own name.—2. E. S. is the largest and most westerly island of the New Hebrides, being in lat. 15° s., and long. 167° east. It is said to measure 80 m. by 40.—3. E. S. is a cape of Tierra del Fuego, in lat. 52° 38′ s., and long. 68° 37′ west.—4. E. S. is a considerable town near the center of Cuba. It contains about 9,982 inhabitants, fully one half being whites.—5. E. S. is a bay of the gulf of Mexico, forming part of the almost continuous back-water of Texas. It is in lat. 28° 30′ n., and long. 97° 30 west. Towards the open sea, it is breasted by Matagorda island, and on the side of the mainland, it receives the Guadaloupe.

ESPLANADE' (in fort.) is the open space intentionally left between the houses of a city and the glacis of its citadel. It requires to be at least 800 paces broad, that the enemy, in case of his getting possession of the town, may not be able to assail the citadel under cover of the nearest houses. For this purpose, the citadel must command the E., and be able to send a direct fire into the streets opening upon it. In old works on fortification, the term is often applied to the glacis of the counterscarp, or the slope of the parapet of the covered way towards the country.

ESPOUSAL. 1. Among the Jews, the ceremony of betrothal or of engagement to be married. It was entered into a year or more before marriage, and consisted in giving and receiving before witnesses, either a piece of silver as a pledge, or a written contract wherein the bridegroom bound himself to give a certain sum as a portion to the

bride. From the time of espousal the woman was considered as the lawful wife of the man to whom she was betrothed. 2. In the early Christian church also, a ceremony of espousals preceded marriage. The preliminaries consisted in a mutual agreement between the parties that the marriage should take place within a limited time, confirmed by certain donations as the earnest of marriage, and attested by a sufficient number of witnesses. The free consent of parties contracting marriage was required by the old Roman law and by the code of Justinian. The gifts bestowed were publicly recorded. The dowry settled on the bride was stipulated in public instruments under hand and seal. The ring was given at the betrothal rather than at the actual marriage. The use of the marriage ring has been traced to the 10th c., its recognized place being then as now on the woman's fourth finger. The witnesses present, friends of both parties, were usually ten in number. The espousal, as incorporated with the wedding-rite, is plainly traceable in the usages of the Roman, Anglican, and other churches at the present day.

ESPRINGAL, or SPRIN'GAL, in the military engineering of the days before the introduction of gunpowder into European warfare, was a machine for throwing missiles. These missiles were either large darts called *muchettes*, or arrows winged with brass, and called *viretons*, from their whirling motion when shot forth.

ESPRIT D'IVA, an aromatic liquor made in Switzerland, from a plant called GENIPI (*achillæa moschata*, or *ptarmica moschata;* see ACHILLÆA). Like the *Swiss tea* made from the same plant, it possesses sudorific properties.

ESPY, JAMES P., one of the most original and able meteorologists of the present century, was the son of a farmer in western Pennsylvania, where he was b. in 1784 or 1785. He received a superior education, and, during he earlier part of his career, was one of the best classical and mathematical instructors in Philadelphia. E.'s attention was first strongly turned to science by the writings of Dalton and Daniell on meteorology. After some time, his enthusiasm became so great, that he resolved to give up teaching, and to rely for the means of prosecuting his meteorological researches upon his slender savings and the success of his lectures on the subject, which, fortunately, turned out to be far more attractive than the average of popular lectures. His first course was delivered before the Franklin institute of Pennsylvania. E.'s theory of storms (with which his name is specially connected) drew general attention to itself, especially in the United States. See STORMS. A memoir on this subject gained for him, in 1836, the Magellanic premium of the American philosophical society of Philadelphia. In 1841, appeared his work on the *Philosophy of Storms*, regarding which the report of the *Académie des Sciences* (Paris) says, "that the theory on which it is based alone accounts for the phenomena. . . . In a word, for physical geography, agriculture, navigation, and meteorology, it gives us new explanations, indications useful for ulterior researches, and redresses many accredited errors." Later in his life, E. became professor in the Philadelphia high school, and afterwards in the Franklin institute of that city, He traveled extensively through the United States, lecturing on his favorite theory of storms, and studying the laws of climate, until he acquired the popular title of the "storm-king." After the organization of the Smithsonian institution at Washington, he was commissioned by Dr. Henry, its superintendent, to pursue his researches. It was in the halls of the Smithsonian that his experiments on the rate of cooling of gases of different densities when expanded were made. The cooling effects of expansion on dry and moist air also formed the subject of nice experiments. The results of these experiments have thrown much light on the formation of cloud and rain, and the propelling power of winds. They afforded materials for his elaborate and valuable reports on meteorology, presented to the senate of the United States. Four of these reports were published at the expense of government. The last was issued in 1857, which embodies all his matured opinions on meteorological phenomena. This is one of the most valuable works on the principles of the science. He d. in Cincinnati, Ohio, 24th Jan., 1860, at the residence of his nephew.

ESQUIMAUX, or ESKIMOS, is the name of a nation inhabiting the coasts of all the seas, bays, inlets, and islands of America n. of the 60° of n. lat.; from the eastern coast of Greenland, in long. 20°, to the strait of Behring, in long. 167° west. On the Atlantic, they are to be found along the entire coast of Labrador to the strait of Belleisle, and down the e. side of Hudson's bay nearly as far as James's bay; while on the Pacific they reach as far as the peninsula of Alaska. They are also to be met with on the Asiatic side of Behring's strait, and, though few in number, may be regarded as the most widely spread nation in the world, occupying, according to Mr. Gallatin, not less than 5,400 m. of coast, without including the inlets of the sea. "The Eskimo," says Dr. Latham, "is the only family common to the old and new world—an important fact in itself, and one made more important still by the Eskimo localities being the only localities where the two continents come into proximity." Nothing, however, has as yet come out of a consideration of this fact in the way of tracing, with absolute certainty, a connection between the E. and any well-defined Asiatic race. The name itself, *Esquimaux* or *Eskimo*, does not help us in any such attempt, being from an Algonquin or Abenaki word, signifying "eaters of raw flesh." This is not the native name, for they call them-

selves "Inuit," or "people;" the Scandinavians of the 10th c. called them "Skroellingar," or "wretches;" while the seamen of the Hudson's bay ships designate them as "Seymos," or "Suckemos"—appellations, according to Richardson, "evidently derived from the vociferous cries of Seymo or Teymo with which the poor people greet the arrival of the ships." The E. are usually reckoned by ethnologists to belong to the Mongolian race, but Duponceau and Gallatin find a strong resemblance between them and the red Indians of North America, which is the view also taken by Prichard—the last mentioned regarding them as a kind of link between the northern Asiatic and American family of nations. Latham, on the other hand, pronounces them to be Mongolian in physiognomy, with flat nose, projecting cheek-bones, eyes often oblique, and skin more brown than red or copper colored; thus presenting a marked contrast to the North American Indians. Their language, however, is, he acknowledges, American in respect to its grammatical structure, being composed of long compound words, and regular, though remarkable, inflections. With respect to the complexion of the E., sir John Richardson is of a different opinion from any of these authors, describing it as nearly white, when relieved from the smoke and dirt with which it is usually incrusted. Many of the young women, he considers, may even be called pretty, when this operation has been performed. "The young men," he says, "have little beard; but some of the old ones have a tolerable show of long gray hairs on the upper lip and chin, which the red Indians never have, as they eradicate all stray hairs. The Eskimo beard, however, is in no instance so dense as a European one." In stature, the E. are usually represented as not being more than 5 ft. in height; but the authority just mentioned describes them as ranging from 5 ft. to 5 ft. 10 in., and even more. They are broad-shouldered, and, when seated in their boats, look tall and muscular, but, when standing, appear to lose some of their height, from the shortness of their lower extremities. The E. live usually throughout their long lines of coast in small villages, containing about five or six families each. The men occupy themselves entirely in hunting, while the women perform the domestic drudgery, which consists principally in preparing the food, of which both sexes consume a large quantity. This is almost entirely of an animal nature, but not without variety, embracing the reindeer, geese and other birds, the seal, walrus, salmon-trout, and various other kinds of fish. They are expert hunters and fishers, and, aided by their dogs, make considerable havoc among the arctic animal tribes. Where whales are common, Aug. and Sept. are devoted to the pursuit of these animals, and great joy is manifested when they capture any of them, as from the blubber of these they get their supply of oil for lights in the long winter season. Of vegetables, they scarcely taste any except in the autumn. "Carbon is supplied to the system by the use of much oil and fat in the diet, and draughts of warm blood from a newly-killed animal are considered as contributing greatly to preserve the hunter in health." The habits of the E. are filthy and revolting in the extreme. A great part of their food is consumed without any attempt at cooking it, and they drink the blood of newly-killed animals as the greatest delicacy that could be offered them. In the short summer, those who can afford it live in tents; but in the winter they all equally live in snow-huts, the stench of which, from the offal with which they are stored, and the filthy oil that gives them light, makes them insupportable to the European. The dress of both sexes is nearly the same, consisting of the skins of animals, reindeer, birds, and even fish—whatever conduces most to warmth, without much regard to appearance; but in their winter abodes they usually wear nothing except trousers. Their religion consists principally in superstitious observances, but they believe, we are told, in two greater spirits, and many lesser ones. The Moravian mission in Greenland, commenced by the benevolent Hans Egede (q.v.), in 1721, has succeeded in converting many of them to Christianity; and they are represented by the missionaries to be a mild and teachable people, easily led by kindness to distinguish between what is morally right and wrong. Where the missionaries, however, have not penetrated, our arctic voyagers generally speak of them as honest among themselves, but incorrigibly dishonest, and prone to lying and exaggeration with strangers.—See Dr. Rink's *Tales and Traditions of the Eskimo*.

ESQUIMAUX DOG, a kind of dog extensively spread over the most northern regions of North America and of eastern Asia; large, powerful, with long rather curling hair, tail much curved over the back and very bushy, short and pointed ears, and somewhat wolf-like aspect. These dogs are much used for drawing sledges. They are very sagacious, docile, and patient. The color is generally black and white, brown and white, or dingy white.

ESQUIN TLA, or **ESCUINTLA**, a t. of the state of Guatemala, Central America, 25 m. s. from Guatemala, on the river Michatoya, which falls into the Pacific ocean. It has a fine church. Pop. 6,000, consisting in great part of Indians.

ESQUI'RE (Fr. *escuier*, a shield-bearer, from Lat. *scutum*, a shield). The E. in chivalry was the shield-bearer or armor-bearer to the knight, and hence was called *armiger* in Latin. He was a candidate for the honor of knighthood, and thus stood to the knight in the relation of a novice or apprentice, pretty much as the page did to him. In this capacity he was spoken of as a bachelor, just as the knight-bachelor came latterly to be distinguished from him who had already attained to the higher honors of

chivalry. When fully equipped, each knight was attended by two esquires. The E. was a gentleman, and had the right of bearing arms on his own shield or escutcheon, which is surmounted by a helmet placed sideways, with its visor closed, to distinguish him from a knight or nobleman. He had also the sword, the emblem of chivalry, though he was not girded with the knightly belt. His spurs were silver, to distinguish them from the golden spurs of the knight; and when the king created esquires of old, it was by putting silver spurs on their heels, and collars of SS round their necks. Those who received this honor directly from the sovereign were in general the esquires for the king's body, or those whose duty it was to attend him in his capacity of a knight; an office now nearly obsolete. Tenants of the crown who held by knight's service were a class of feudal esquires generally supposed to correspond to the simple *ritters* or knights of Germany, as opposed to the *ritters* who were *geschlagen* or dubbed, inasmuch as these English esquires were entitled to claim the rank of knighthood. Though the title of E. has now come to be given without discrimination to all persons above the rank of a tradesman or shopkeeper, the following seem to be those whose claim to it stands on the ground either of legal right or of long-established courtesy: 1. All the untitled sons of noblemen; 2. The eldest sons of knights and baronets; 3. The sons of the younger sons of dukes and marquises, and their eldest sons. All these are esquires by birth. Then there are esquires by profession, whose rank does not descend to their children; and esquires by office—e.g., justices of the peace—who enjoy the title only during their tenure of office. To the former class belong officers in the army and navy, barristers, and doctors of law, and doctors of medicine, but not surgeons.

ESQUIROL, JEAN ETIENNE DOMINIQUE, one of the greatest physicians for the insane of modern times, was b. at Toulouse, 4th Jan., 1772. He served in the military lazaretto at Narbonne in 1794, obtained his degree of doctor in 1805, and was appointed physician to the Salpêtrière at Paris in 1811. After 1817, he delivered clinical lectures on the diseases of the mind, and their cures; in 1818, his exertions secured the appointment of a commission, of which he became a member, for the remedy of abuses in madhouses; in 1823, he became inspector-general of the university; and in 1825, first physician to the *Maison des Aliénés*. In the following year, he was also appointed principal physician of the private lunatic asylum at Charenton, which he had organized with admirable skill. At the July revolution, he lost all his public offices, and withdrew into private life. He died 12th Dec., 1840. E. combined, in a truly rare and wonderful manner, the qualifications requisite for a physician of the body and a physician of the mind. By his humane and moral treatment of the insane, he often effected the happiest cures. His writings embrace all the questions connected with the treatment of insanity. E. also paid great attention to a very important subject, viz., the construction of suitable buildings for the insane; and most of the modern lunatic asylums in France, such as those of Rouen and Montpellier, have been built according to his advice. His most important work is *Des Maladies Mentales considérées sous les Rapports, Médical, Hygiénique et Médico-légal* (1838).

ESQUIROS, HENRI ALPHONSE, a poet and romancist of France, a representative in the national assembly, was b. at Paris in 1814. He made his *début* as an author in 1834, when he published a volume of poems, entitled *Les Hirondelles*, which, although highly praised by M. Victor Hugo, had but a very limited sale. *Les Hirondelles* was followed by two romances, *Le Magicien* (1837) and *Charlotte Corday* (1840). About this time he also published a philosophic and democratic commentary on the life of Christ, under the title of the *Evangile du Peuple* (1840). For the publication of this work, E. was prosecuted, and sentenced to 8 months' imprisonment and to a fine of 500 francs, 30th Jan., 1841. In the same year he published his *Chants d'un Prisonnier*. He also wrote three little works between 1841 and 1842—these were *Les Vierges Martyres*, *Les Vierges Folles*, and *Les Vierges Sages*. His *Histoire des Montagnards* appeared in 1847. After the revolution of Feb., 1848, E. was elected a member of the legislative assembly. Distinguished by his radical opinions, he was included, after the 2d Dec., 1851, among the number of members to be expelled; on which he retired to England. His *La Vie Future au Point de Vue Socialiste* appeared in 1857; and his *La Morale Universelle*, his *L'Angleterre et la Vie Anglaise*, and his *La Neerlande et la Vie Hollandaise* in 1859. In 1869, he was returned to the corps legislatif for the fourth circumscription of the Bouches du Rhone; and was appointed supreme administrator of that department by the government of the national defense in 1870. In 1871, he was returned to the national assembly, and in Jan., 1876, was made a member of the senate. He died 13th May, 1876, at Versailles.

ESS, HEINRICH LEANDER VAN, or JOHANN HEINRICH, 1772–1847; b. Westphalia; educated in the Dominican gymnasium of Warburg; a Roman Catholic priest from 1797 to 1812; and then professor of theology in the Marburg seminary. In 1807, he published the New Testament in German, but its circulation was forbidden by the pope. The next year he published a defense of his views, advocating the reading of the Bible by the people. In 1816, he published *What was the Bible of the first Christians?* and in 1818, *The Bible not a Book for Priests*. In 1840, he completed a German translation of the entire Bible. His library of 20,000 volumes, unusually rich in early editions of the con-

troversial works of the period of the reformation, was purchased after his death, and given to the Union theological seminary in New York.

ESSAYS AND REVIEWS, by six clergymen and one layman of the church of England (the Rev. Drs. Frederick Temple and Rowland Williams, prof. Baden Powell, H. B. Wilson, Mark Pattison, prof. B. Jowett, and Mr. C. W. Goodwin), were published in an 8vo. vol. in Mar., 1860. The book did not excite much attention at first, but having been severely censured for heterodox views by nearly all the bishops and many of the clergy, it created much excitement in 1861, and was condemned by convocation June 24, 1864. The ecclesiastical courts sentenced the Revs. R. Williams and H. B. Wilson to suspension for one year, and costs, Dec. 15, 1862; but on appeal the sentenced was reversed by the judicial committee of the privy council, Feb. 8, 1864. The most remarkable among the works put forth in opposition (in 1862) are the *Aids to Faith*, edited by the bishop of Gloucester (W. Thomson, now archbishop of York), and *Replies to Essays and Reviews*, edited by the bishop of Oxford (Samuel Wilberforce). The appointment of Dr. Temple to the see of Exeter was much opposed on account of his essay in this collection.

ESSAAD-EFFENDI, MOHAMMED, a Turkish historian, was b. at Constantinople, 16th Dec., 1790. He was surnamed Sahaf-Zadeh, "son of the bookbinder," on account of his father having been president of a corporation of bookbinders and librarians. At the age of 18, he became a teacher; in 1825, he was appointed historiographer to the Ottoman empire. In 1831, the superintendence of the *Tatawin-i-wekaii* (Table of Events), the official journal of the empire, was placed in his hands. In 1835, he was employed by the late sultan Mahmoud on an embassy to Mohammed, the son and successor of the king of Persia. E. had also the titles of grand judge of Roumelia, inspector-general of schools, and member of the council of public instruction.

The works of E. comprise, among others, the *Uss-i-Tzafer* (the Establishment of Victory), a work which has been translated into French, and published by M. Causin de Perceval, with the following title: *Historic Summary of the Destruction of the Janizaries by the Sultan Mahmoud in* 1826 (Par. 1833).

ESSEG. See ESZEK (*ante*).

ESSEN, a t. in Rhenish Prussia, situated between the Rhur and the Emscher, 20 m. n.e. of Düsseldorf, stands in the midst of a rich coal and iron district. The town is surrounded by the high chimneys of the steam-engines used in working the mines. As it has risen only very recently to its present importance, its architectural beauties are not great; it has, however, an imposing cathedral, containing many curious reliquaries, crosses, etc. E. owes its prosperity to the inexhaustible coal-mines in its vicinity. Owing to this, there are in the neighborhood extensive works for all sorts of manufactures in iron. The enormous works of Herr Krupp, the discoverer of the method of casting steel in very large masses, who employs about 14,000 men, are at Essen. At them are manufactured many articles for peaceful purposes; but the gigantic steel guns which the Germans used with such terrible effect at the siege of Paris (1870–71) have made the name of Krupp world-renowned. In 1872, 125,000 tons of steel were cast. Pop. '75, 54,852. Although the industrial activity of E. is only of recent growth, the town itself is very old, and can trace its origin to the famous Benedictine nunnery of the same name, founded in 873 A.D.

ESSEN, HANS HENRIK, Count, 1755–1824; b. Sweden; educated in the state university; accompanied Gustavus III. in his travel abroad. He attended the king at the masked ball where the latter was assassinated by Anckarstroem, Essen having warned Gustavus of a probable attempt on his life. In later years, Essen was governor of Stockholm, governor-general of Swedish Pomerania and Rügen, and in 1807, commander of the Pomeranian army, distinguishing himself by the defense of Stralsund. Still later he was a member of the council, and ambassador in Paris. After the union of Sweden and Norway he was appointed governor of the latter country, and in 1817, governor-general of Scania.

ESSENCE, in philosophy (from esse, to be), is that which constitutes the particular nature of a being or substance, or of a genus, and which distinguishes it from all others. Locke's statement, that E. may be taken for the very being of a thing, whereby it is what it is, agrees with this definition. He makes, also, a distinction between nominal and real E., saying, for example, that the nominal E. of gold is the complex idea expressed by the word; and that its real E. is the constitution of its insensible parts on which its properties depend and which is unknown to us. In theology, Athanasius and other Greek writers distinguish *ουσια* (essence or substance), denoting what is common to the Father, Son, and Holy Spirit, from *ὑποστασιρ*, denoting what is individual, distinctive, and peculiar. In modern writers, essence and substance are generally used as virtually synonymous, and representing, in any object, all that the human mind cannot know, while all that can be actually known is called quality or accident. As both terms are often vaguely employed, it is necessary, wherever they occur, first of all to ascertain the sense in which the writer intends them to be understood.

ESSENCE DE PETIT GRAIN is obtained by distillation from small unripe oranges, about the size of a cherry, and is used as a perfume in the same manner as *orange-flower water*.

ESSENCES are solutions of the essential oils in alcohol, and may be prepared (1) by adding rectified spirit to the odoriferous parts of plants, or to the essential oils, and distilling; or (2) simply by adding the essential oil to the rectified spirit, and agitating till a uniform mixture is obtained. Thus, the essence of lemons is merely a solution of the volatile oil of lemons in rectified spirit. This term is frequently used as synonymous with volatile oils.

ESSE'NES (*Essēnoi, Essaioi*), a small religious fraternity among the Jews, whose name and origin, as well as character and history, are alike involved in obscurity. Still, in the wide field of the history of the Semitic religions, there are not many subjects of inquiry of greater importance, or calculated to inspire a deeper interest. The E. bore one of the most momentous parts in the development of Judaism. Christianity stands in so close connection with them, that John the Baptist and Christ himself have been pronounced to have originally issued from their ranks. More surprising than all, out of Essenism, in the stage of Sabæism, has sprung Islam itself, and in this last development of its tenets and practices are still preserved some of its principal rites. It is but natural that from the days of the fathers to our own, an infinite number of writers, more or less qualified for the task, should have endeavored to throw light on this mysterious brotherhood, but with success far from satisfactory. The reason of this is obvious enough. Josephus, Philo, Pliny, Solinus, Eusebius, and the fathers generally, were considered the sources, and the only sources, from which the genuine history of this fraternity could be deduced. Of these, Pliny indeed has a geographical notice, which cannot be traced to either Philo or Josephus; but the rest have so evidently derived their shallow and contradictory accounts indirectly, and through corrupted channels, from those two writers, that they lose all claim to consideration. Of the two books of Philo in which information regarding the E. is contained, one (*De Vita Contemplativa*) is proved to have been written about three centuries after Philo's death by a Christian monk as a penegyric on ascetic monachism. The other (*Quod Omnis*) is, to say the least, of doubtful genuineness, and is, moreover, at variance with Josephus. As to Josephus himself, it is now pretty generally allowed that his E. stand in much the same relation to the historical E. as the ideal inhabitants of the *Germania* of Tacitus stand to the real Germans of his time. Strange that for so many centuries the real and genuine sources—the Talmudical writings—should never have been thought of. These, *together* with Josephus and Philo, Pliny, and the Arabians Macrisi and Abulfarag, will perhaps better enable us to form an idea, not only of the real state of this community, but, what is of no less moment, to trace the process by which they gradually arrived at their peculiar mode of life and worship. We need not remind the reader that we must strictly confine ourselves here to an epitome of facts and conclusions.

We have to premise, that exception must at the outset be taken to the opening statement of Josephus, that there were three different "sects" among the Jews: the Pharisees, the Sadducees, and the E.—a statement which has been copied and accepted from that day to the present. The Sadducees were a political party, nothing more or less, and, as a matter of course, held religious views antagonistic to, or rather they did not accept the traditions of, their adversaries, the Pharisees, who, again, forming as they did, the bulk of the nation, cannot rightly be called a *sect*. Least of all were the E. such. They were Pharisees of stronger convictions, and carried out the Pharisaic views with a consistency which made them ridiculous even in the eyes of their own mother-party (Sota, 26, a.); neither were they known by the names of E., this being a very late designation, derived either from a Chaldee word *sacha*, and meaning bathers, or baptists; or from *asa*, meaning healers. The Mishna, Beraitha, and Talmud speak of these advanced Pharisees in general as Chasidim (*Assidaioi*, pious men), Nazirim abstinents), Toble Shachărith (hemerobaptists), Banai (builders), and Chaberim (friends). The Arabic book of *Maccabees* calls the E. simply *Assidaioi*, and Macrisi speaks of "Nazirs, Essenes, and Baptists" as *all* being "Asaniun," or Essenes.

The Nazirhood, a kind of voluntary priesthood, enjoining abstinence from wine, flesh, and other sensual enjoyments, had, in the troublous times of anti-Syrian agitation, and the general upheaving of society, found numerous adherents (*Tosifta Nazir.* c. 4; *Talm. Babli Berach.* 48, a. 1; *Macc.* ii. 49; Jos. *Antiq.* xviii. 1); and gradually there sprang up (contrary to the Bible, which restricts this asceticism to a certain period) a host of men calling themselves "Nazirs forever"—Nazire olam (*Nazir* 4, a.). Pharisees of a spiritual and contemplative bias, with no natural taste for the conflicts and activity of political or public life, or wearied, perhaps, with the vanity of human aims, took this vow of Nazirship for life, and constituted themselves into a sort of religious club. Levitical purity in its strictest and highest sense made them draw closer and closer the innumerable "*fences*" which the traditional law had erected round the biblical law. Any one, friend or foe, could, at any moment, by having touched something impure, disturb this purity for the time, and necessitate new and endless purifications. Thus it became necessary, or at least expedient, that those among them who could break all ties of friendship and family, should retire into a solitude not easily approach

able by a stranger to their community. Food, again, could not be prepared save by those of the brethren who knew and strictly obeyed the hyper-traditional injunctions. Their dress, every implement of daily use, had to be made under similarly stringent laws of purity. A natural consequence of this their exalted notion of outward priesthood, was—the different phases of woman's life taken into consideration—their general celibacy. (The explanation given by Josephus—the fear of the corruption of both towns and women—is entirely gratuitous, and utterly in discordance with the Jewish notions of the time.) In this state of voluntary isolation, trading was out of the question; they tilled the ground, and lived on the fruits of the earth. Taking their meals, and these of the coarsest and plainest description, in common, they idealized the table into an altar, and, prayer having been said, they remained standing silently round it during the repast. That they had no individual property, follows of course, and their communistic motto, which the Mishna (Aboth) has preserved to us—"Mine is thine, and thine is mine"—explains itself. We need not enlarge further on their small eccentricities—on the white linen garment, the apron (kenaphaim), the scoop or shovel; they are, one and all, signs and symbols of Levitical purity, the scoop reminding us of a certain Mosaic ordinance during the wanderings in the desert, the apron becoming necessary from the frequent ablution of their hands. Every morning, they bathed, like the priests who ministered in the temple, in pure spring water. They abhorred blood as a source of impurity, and for this reason, probably, some of them abstained also from going up to the temple, where sacrifices were daily offered; others we find present at a festival in the temple (Succah, 51, 53). Their offerings were sent alive under the care of messengers. But these were but outward signs of purity, stepping-stones to inner piety, to communion with God, which was only to be acquired, according to their notion, by solitude and an ascetic life. The belief in the efficacy of the most rigid simplicity and willing self-sacrifice, they held in common with the Pharisees; their horror of oaths, their frequent prayers, their occupation with mystical doctrine, were their own. Untroubled by the noise of war or the strife of parties, leading a life divided between the bath, ablutions, contemplation, and prayer; despising the body and bodily wants; what more natural than that by degrees they should be led into a kind of mystical enthusiasm and fanaticism. They allegorized, they symbolized; and their efforts culminated in seeing the unseen. Absorbed in the attempt to fathom the mysteries of the nature of God, one of their principal occupations was the study of the name of God; of that unpronounceable name which only the high-priest dared utter once a year in the holy of holies during the most awful and solemn service on the day of Atonement. The knowledge of that name in four, in twelve, and in twenty-four letters, would give them the power of prophecy and of "receiving the Holy Ghost."

Angelology, derived from the Magi, formed a prominent feature of their creed. In course of time, they were looked upon by the vulgar as saints and workers of miracles. A wonderful book of cures (*Sepher Refuoth*), which Talmudic, Arabic, and Byzantine authorities alike ascribe to Solomon, was in their hands, and with this, "by the aid of certain roots and stones," by the imposition of hands, and certain whisperings—a practice strongly condemned by the Pharisees (Synhedr. 90, a.)—they cast out demons, and healed the sick. Philosophy they regarded in so far only as it treated of the existence of God. Jehovah is the original light; from him proceed a number of spirits (the Platonic ideas). and at their head stands the wisdom, or *logos*, into which, after death, the soul is again absorbed. Their code of ethics was threefold—the love of God, of virtue, and of man; their scale of perfectibility reaching its acme in the communion with the Holy Ghost (*Ruach Hakodesh*), (Mishn. Sota, 99). In fine, mixing up, in the strangest manner, the most exalted and the most puerile notions, they became the forerunners of the Christian Gnostics and of the Jewish cabalists, and, it may be, of many secret, still existing orders, who may have derived from this source their ceremonies and the gradations of initiation.

They seem never to have numbered more than 4,000, including even those Nazirs or E. who remained in their own families. Their colony appears to have been established chiefly near the Dead sea, and it is undoubtedly this colony which has served Josephus as a basis to his romantic E. republic. But, however distant from each other they might be, a constant intercommunication was kept up through a body of delegates, or angels (Malachim). As they had sprung from the Pharisees, so they again merged into them—part of them, we should rather say; the remaining part became Therapeutæ, or Christians. See THERAPEUTÆ and JEWISH SECTS. The Talmud gives a distinct account of their ceasing to exist as a separate community (Bechorot, 27), and so soon after their extinction did they fall into oblivion, that in the third century we find a Jewish sage asking who *these Hemerobaptists* had been (Berachot, 22, 1).

Much has been written and said of a certain literature which they possessed; on this we are unable to decide, deprived as we are of all trustworthy authority. One fragment only remains; it is quoted in the Talmud (Jerusch. Berachoth. End) in the following words: "It is written in the book of the *Chasidim*, If thou leavest it (the divine law) for one day, it will leave thee for two."

In addition to the Talmud and Midrash, we refer the reader to Joseph. *Antiq.* xv. 10, xviii. 1, *Jew. War*, ii. 7, 8; Philo, *Quod Omnis Prob. lib.* § 12; Plinius, *Hist. Natur.* v. 17; Epiphan. *Hæres.* xxix.; Hieron., Cyrill., Chrysost., etc. Beckermann, *Ueber die*

Ess. (1821); the histories of the Jews by Iost, Ewald, and Grätz; articles by Franckel; Sprenger's *Leben Mohammad's* (1861); and Leutbecher's *Die Essäer* (1857).

ESSENTIAL OILS. See OILS.

ESSEQUI'BO, the most westerly of the great rivers of British Guiana, rises in the Acarai mountains, 41 m. n. of the equator, and after a course of 620 m. enters the Atlantic near the Venezuelan frontier, forming an estuary 20 m. wide, in which lie numerous fertile islands. The E. receives numerous large tributaries, as the Cuyuni and Mazaruni; on the Potaro, another affluent, is the magnificent Great Kaietur fall, above 700 ft. in sheer descent, discovered in 1870. On the banks of the E. are forests of locust-tree, iron-wood, ebony, greenheart, and other fine timber trees, festooned with orchids, and laced together with lianas and other climbing plants. Beyond the forests are vast savannahs, formerly forests destroyed by fire, and now swamps of brushwood, reeds, and coarse grass. The E. is navigable for large ships to the first cataracts, about 60 m. from the sea. The co. of E. has not prospered so much as Demerara and Berbice. Many of the old plantations are out of cultivation. Pop. 27,000, exclusive of about 2,000 Indians.

ESSES, COLLAR OF, a chain-like collar, composed of links in the shape of the letter S; found in various old insignia of England. It is said to have been worn by esquires especially. Some claim the SS to be the symbol of Saint Simplicius.

ESSEX, a co. in n.e. Massachusetts on the New Hampshire border and the ocean, traversed by the Merrimack and Ipswich rivers, and the Boston and Maine, the Eastern, the Salem and Lowell, the Danvers and Newburyport, and some other railroads; 520 sq.m.; pop. '75, 223,342. It has a rugged and uneven surface, and its business is mainly in manufactures of cotton, wool, leather, etc. There are quarries of granite and syenite. There are six cities or large towns in the co., and it has three co. seats, Salem, Newburyport, and Lawrence.

ESSEX, a co. in n.e. New Jersey, almost encircled by the Passaic river, and bordering on Newark bay; intersected by the New Jersey, the Morris and Essex, and the Paterson and Newark railroads; 150 sq.m.; pop. '70, 143,839. The soil is fertile; but besides market gardening there is little of agriculture, the people being mostly engaged in manufactures. Co. seat, Newark.

ESSEX, a co. in n.e. New York, w. of lake Champlain, on the head waters of the Hudson, and intersected by Au Sable river, and the Champlain division of the Delaware and Hudson canal company's railroad; 1926 sq.m.; pop. '75, 34,374. In the w. part of this co. are the highest peaks of the Adirondacks, covering a large region entirely unsettled. The soil is fertile. There are beds of magnetic iron ore, and a number of extensive iron works. There are nearly 100 lakes, large and small, in the county. Co. seat, Elizabethtown.

ESSEX, the n.e. co. of Vermont, between the Connecticut and Passumpsic rivers, crossed by the Grand Trunk railway; 790 sq.m.; pop. '70, 6,811. It is a rough and cold region, not favorable to the growth of cereals. There are very large forests of sugar maple. Co. seat, Guildhall.

ESSEX, a co. in e. Virginia, bounded by the Rappahannock, which is navigable; 270 sq.m.; pop. '70, 9,927—6,650 colored. The surface is uneven, and the soil for the most part sandy. Co. seat, Tappahannock.

ESSEX, a maritime county of the s.e. of England, having the North sea on the e.; the Thames estuary, dividing it from Kent, on the s.; Middlesex and Hertford on the w.; and Cambridge and Suffolk on the north. Its greatest length from n.e. to s.w. is 63 m., and the greatest breadth from e. to w. is 54 miles. It has 1,055,161 statute acres, nine-tenths being arable or in grass, and a twentieth in wood. The coast-line is 85 m. long. Some cliffs at the Naze are 35 ft. high. The center and n. of the county are beautifully diversified and richly wooded, the highest point being Langdon hill, 620 ft. above the sea. Besides the Thames, the other chief rivers are the Stour, 50 m. long; Blackwater, 46 m.; Lea, Roding, Crouch, and Chelmer. The e. of the county is mostly on London clay, with limestone beds near Harwich. In the n.w., chalk appears. In the middle and n., there is much diluvium, with chalk fragments. Crag occurs near Harwich, and stones of phosphate of lime are found here and there. E. has few manufactures, except in the neighborhood of London, where are chemical works, tar, and other works of a kind that could not be carried on in a large scale within the metropolitan boundaries. The Thames iron-work and ship-building company, near the new Victoria docks, are another manufacturing feature of the county. At Colchester, there is a great silk-mill, as there are also at Bocking, Braintree, and Halstead. Tambor lace is made at Coggeshall and a few other places; there is straw-plaiting in some of the smaller towns, but the county has, notwithstanding, comparatively few distinctive manufactures. The chief crops are wheat, barley, oats, beans, potatoes, saffron, caraway, and hops. Great numbers of calves are fattened for the London market, and there are large sheep-flocks. E. has valuable oyster-fisheries. Pop. in 1861, 404,644; in 1871, 466,436. The county is almost entirely in the diocese of Rochester. E. returns six members to parliament. E. was once forest-land, and the seat of a powerful tribe, the

Trinobantes, whose famous chiefs, Caractacus and Boadicea, were overthrown by the Romans. E. constituted part of the Roman *Flavia Cæsariensis*. It has afforded many Roman remains, and a Roman road once passed through Colchester, which was an important Roman station. The Saxon kingdom of Essex included London and parts of Middlesex, Hertford, Bedford, and Essex.

ESSEX, a co. in the province of Ontario, Canada, between lakes Erie and St. Clair; traversed by the Great Western and the Canada Southern railroads; 235 sq.m.; pop. '71, 32,697. Co. seat, Sandwich.

ESSEX, ROBERT DEVEREUX, EARL OF, son of Walter Devereux, first earl of E., was born at Netherwood in Herefordshire, 10th Nov. 1567; entered Trinity College, Cambridge, at the age of 10, where he remained for four years. Lord Burleigh, to whose guardianship he had been intrusted, introduced the handsome and gifted youth at court in 1584. Here, by his agreeable manners, his appearance, and talents, he established himself among troops of friends, and gained the special favor of Elizabeth. In 1585, he accompanied the earl of Leicester to Holland, where he distinguished himself at the battle of Zutphen, and on his return to England was made master of the horse and knight of the garter. After the death of Leicester, E. continued to rise in the favor of Elizabeth, who loaded him with honors. In 1591, he commanded the forces sent to the assistance of Henry IV. of France against the Spaniards, but achieved no success. The next few years were spent in endeavoring to get the better of Burleigh—the wisest, the most prudent, and the most politic of all Elizabeth's advisers. In 1596, he was appointed joint-commander with lord Howard in the expedition against Spain, to which Burleigh was strongly opposed; and though E. displayed all his wonted courage, and contributed to the capture of Cadiz, which caused immense loss to the Spaniards, yet the expedition resulted in nothing, and E. had to defend himself against various accusations on his return. In 1597, he was made earl marshal of England, and, on the death of lord Burleigh, chancellor of Cambridge. In 1598 occurred the first fatal mistake in E.'s career. Presuming upon Elizabeth's admiration and feminine fondness for his person, he differed from her about some trifling matter, and angrily and rudely turned his back upon her in the presence of some of the council, and her majesty, whose language was hardly more delicate than her father's, gave him a vigorous box on the ears, telling him to "go and be hanged." A violent quarrel ensued, which, though apparently smoothed up, was never really so. E. was afterwards, in 1599, sent to Ireland—part of which at that time was in a state of rebellion—as lord-lieutenant of that country; but here his government was ill-advised and ineffectual, and after a few unimportant undertakings, he concluded a truce with the rebels, which was regarded at court as high treason. In order to confront his enemies, he hastened back to London, contrary to the queen's express commands, and forced his way into Elizabeth's bedchamber. Justly offended, the queen deprived him of his dignities, and commanded that he should be called to account for his behavior. E., advancing from one degree of foolhardihood to another, tried to excite an insurrection in London. He was imprisoned, tried, and found guilty. Elizabeth long delayed signing the warrant for his execution, in the hope that he would implore her pardon. He was beheaded on the 25th Feb., 1601, after defending himself with pride and dignity. E. was rash, bold, and presumptuous; but brave, generous, and affectionate, and the friend and patron of literary men.

ESSEX, ROBERT DEVEREUX, Earl of, 1591–1646. He was a companion of the prince of Wales. At the age of 15 he was married to Frances Howard, daughter of the earl of Suffolk, but nine years afterwards the marriage was annulled on account of the wife's intimacy with Rochester, earl of Somerset. A second marriage also ended unhappily. In 1620–23, he served in the wars of the palatinate, and in 1625 was vice-admiral of a fleet which made an unsuccessful effort to capture Cadiz. In 1639, he was lieut. gen. of the army sent against the Scotch covenanters; but no fighting was done. His summary dismissal made him an enemy of the king (Charles I.), and in 1642, he was commander of the parliamentary army. He won the battle of Edgehill, captured Reading, and relieved Gloucester; but in 1644, because of his unwillingness to fight the king in person, he lost nearly the whole of his army. In 1645, he resigned his commission, but was granted an annuity of £10,000 for his past services.

ESSEX, THOMAS CROMWELL, Earl of. See CROMWELL, THOMAS, *ante*.

ES-SIOUT. See SIOUT.

ESSLINGEN, a manufacturing t. of Germany, in the kingdom of Würtemberg, is situated near the right bank of the Neckar, in the center of a pleasing and fertile district, 7 m. e.s.e. of Stuttgart. It consists of the town proper, and five suburbs, and is surrounded by strong walls, and fortified by towers. The chief buildings are the *frauenkirche*—a splendid edifice in the purest Gothic style, built in 1440, and surmounted by a spire 230 ft. high—the old and new town-houses, and the old castle. It has the greatest machine-making trade of the kingdom, has manufactures of a wine called Esslingen champagne, of woolens, and cotton and woolen yarns, lackered iron, silver-plate and tin wares, and paper, with a good trade in wine and agricultural produce. Pop. '75, 19,602.

E. was founded in the 8th c., and received, in 1209, the rights of a free city of the

German empire. The long and bloody quarrel which existed between it and the house of Würtemberg was brought to an end at the peace of Lunéville (1802), when E., with its territory, was assigned to the duchy of Würtemberg.

ESSOUAN, or ESWAN. See ASSOUAN.

ESTABLISHED CHURCH, a church established and maintained by a state for the teaching of Christianity in a particular form within its boundaries. Subsequent to the reformation, many of the opinions which had given sanctity to the church of Rome still kept possession of men's minds; amongst these was the notion, that the civil government of each state was bound to maintain a particular form of Christianity. The same fallacious reasoning which in more recent times has led to the search for one absolutely best form of civil government was at work then with reference to the church. The Roman Catholic church was not the best form—of that the Protestant states had become convinced—but all forms were not therefore indifferent; and if one was better than another, and another better than that, there must be an absolutely best, which the state was bound to discover, and when discovered, to substitute for that which had been abolished. The idea that the good or bad qualities of forms of government, whether civil or ecclesiastical, so long as they did not violate the fundamental doctrines of Christianity or morality, were relative, and not absolute, and that whilst one might be the best for men in one stage of development or of one particular temperament, another might be the best for those who differed from them in these respects, did not belong to that age. Each Protestant state consequently established a church, conformity to the tenets of which it enforced, not only upon those who as ministers were henceforth to enjoy the property which in Roman Catholic times had been devoted to the spiritual interests of the community, but very often on its own civil servants and advisers. The benefit of the arrangement was, that, to a greater or less extent, the means which the community had set apart for its own spiritual improvement were protected from the spoliation of private individuals; and this benefit was secured more effectually the more completely the new church took the place of the old—in England, for example, better than in Scotland; but as each of the Protestant states had substituted one form of church-government for another, and as the same form had not been adopted by them all, the idea of there being one form which was absolutely preferable to the others, though not abolished, was rudely shaken. In England, queen Elizabeth had stated in her celebrated declaration, that she, as head of the church, "would not endure any varying or departing in the least degree" from the doctrines of the Episcopal church of England as set forth in the thirty-nine articles; and yet Presbyterianism was established in England in 1649. In Scotland, where Presbyterianism had at first taken root, Episcopalianism had more than once become the law of the land. The effect of such occurrences was to counteract the belief in any one form as the form for all Christendom, and to facilitate dissent and the formation of sects. The pastors of these sects were not at first recognized by the law as entitled to any of the privileges of Christian ministers. Whatever they might be to their own flock, to the state they were laymen, and their churches were mere secular lecture-rooms, or, at most, places of meeting for private devotion. See NONCONFORMISTS, DISSENTERS, CHURCH, etc. Gradually this view become modified, and the civil consequences attaching to sacred rites, when performed by a clergyman of the establishment, were extended to them when performed by dissenters. See MARRIAGE. But though many of the privileges, and all the liberties belonging to the established church, have now been extended to dissenting bodies, including Roman Catholics (see ROMAN CATHOLIC EMANCIPATION) and Jews (see JEW), the established churches of England and Scotland are supported by the state, and guarded from spoliation by the coronation oath (q.v.). The grant to the Roman Catholic college of Maynooth, and the *Regium Donum* (q.v.) to the Presbyterian ministers in Ireland, were capitalized by the act (1869) which disestablished the Irish church. There is no endowment to other religious denominations as in France; and the emoluments of the established church in England, though modified in their distribution by the labors of the ecclesiastical commissioners (q.v.), have not yet been appropriated to any other than religious uses in connection with that church.

The cause of established churches is very generally maintained on the ground of the alleged duty of the state to provide for the religious instruction of the whole body of the people, as most essential to their moral welfare, and so to the general prosperity of the community. It is further argued, in support of the same cause, that civil rulers, or the people as associated in a free state, are under a moral obligation of the highest kind, to acknowledge God, his law, and his ordinances. Concerning which, and other arguments, for and against established churches, as far as it belongs to the scheme of this work to notice them, the reader is referred to the article VOLUNTARYISM. It may here, however, be observed, that the arguments just mentioned do not necessarily infer, even when admitted to the utmost that the state is bound to support in any exclusive way a particular sect or denomination, unless on the further assumption that religious truth and worth belong to that denomination alone. Nor does the *endowment* of a church by the state necessarily follow from the fullest adoption of the principles thus contended for. And, on the other hand, it is a point which may very reasonably be disputed, how far the common arguments against state endowments are applicable to those endowments which were not originally bestowed by the state, but which the state has, from a

very early period, recognized as belonging to the church; a description which will be found to comprehend great part of the existing endowments of established churches. The exclusive possession of them by a particular denomination, and their rightful appropriation to religious uses, are, however, distinct questions.

ESTAFETTE, in Europe, an express for the conveyance of letters and small packages. The articles are consigned to the care of the postilions on duty along the route.

ESTAING, CHARLES HECTOR, Comte d', 1729–94; a French admiral, b. Auvergne. He first entered the army, and in 1757, as brig.gen., accompanied count de Lally to the East Indies. At the siege of Madras, 1759, he was made prisoner, but was released on parole. He at once resumed service in command of two ships of war, and being again taken captive in 1760, he was thrown into prison at Portsmouth for breaking his parole. He was soon released, and was appointed lieut.gen. in the navy in 1763, and in 1777 vice-admiral; and in 1778, commanded the fleet sent to aid the United States against Great Britain, bringing with him Gérard, the first French ambassador to the United States. He planned, with the American generals, a combined land and naval attack on Newport; and his demonstrations forced the British to burn or sink six frigates lying in the harbor; but lord Howe came, with an English fleet, to relieve Newport, and d'Estaing put to sea to engage him. A sudden storm separated the fleets, and d'Estaing put into Boston to repair his shattered ships. In Nov. he sailed to the West Indies, where he captured St. Vincent and Grenada, compelling the fleet which had come to relieve Grenada to retire to the harbor of St. Christopher. With 22 ships he co-operated, Oct. 9, 1779, in the unsuccessful attack on Savannah, and was himself wounded. The following year he returned to France. He commanded the combined fleet before Cadiz, when the treaty of peace was signed in 1783. Entering into French politics, he was elected to the assembly of notables in 1787, in 1789 he commanded the national guard, and in 1792 the national assembly chose him admiral. In 1793, he bore testimony in favor of Marie Antoinette. The following year he was himself brought to trial, condemned, and executed.

ESTATE. In the law of England, an estate in lands, tenements, or hereditaments, signifies such interest as the tenant hath therein; so that if a man grants all his estate in Dale to A. and his heirs, everything that he can possibly grant shall pass thereby.—Blackstone, *Comm.* ii. 103. The first division of estates is into legal and equitable. By the former is signified the estate which a man has by the common law; by the latter, the interest which has been created by the operation of a court of equity. See EQUITABLE ESTATES, USES, TRUST. Legal estates are considered in England with reference to the quantity of the estate, the time of enjoyment, and the number of persons who may unite in the enjoyment. Under the first head, estates are either freehold or less than freehold. Freehold estates, again, are divided into freeholds of inheritance, or fees; and freeholds not of inheritance, or for life. An estate for life may be for the life of the person to whom it is granted, or for that of another person, or for more than one life. A person holding an estate for the life of another is called tenant *pur autre vie*. An estate *pur autre vie* being a freehold, descends, in case of the death of the tenant during the term, to his heir, and not to his executor. An estate by the courtesy of England (q.v.), and an estate in dower (q.v.), are estates for life. A conveyance to A. B., without mention of heirs, makes the grantee tenant for life. An estate to a woman during her widowhood, or to a man until the occurrence of a specified event, as till he receive a benefice, will be construed to be an estate for life. Tenants for life are entitled to take estovers (q.v.), but they must not commit waste (q.v.). The representatives of a tenant for life are also usually entited to take the emblements (q.v.) on the expiry of the term. Estates less than freehold are called also chattels real. This species of estate, on the death of the tenant, passes, like other chattels (q.v.) to the executor, and not to the heir. They are divided into estates for years, estates at will, and estates on sufferance. See LEASES. Estates, with reference to the time of their enjoyment, may be either in possession or in expectancy. An estate in possession comprehends not only an estate in the actual occupation of the tenant, but one from which he has been wrongfully ousted. In this latter case, the law regards the rightful tenant as having the actual estate, to which is attached the right of entry (q.v.). An estate in expectancy may be either in reversion or remainder (q.v.). Estates of this character form a large portion of the rights to land in England, and are the subject of some of the most subtle learning of the English law. With reference to the number of persons entitled to the enjoyment, estates may be in severalty, in joint-tenancy, in coparcenary, or in common. An estate in severalty is where the sole right to the estate is in a single person. See JOINT-TENANCY, COPARCENARY, TENANCY IN COMMON.

ESTATE (*ante*), in law a term signifying in its broadest sense an interest in any kind of property, but more especially in lands. By the common law there are two general divisions of estates in lands, according to the amount of interest in the same in different cases. There are, first, freehold estates; secondly, estates less than freehold. A freehold estate is for life or longer. An E., the possession of which is limited to a certain number of years, or circumscribed by other conditions, is less than a freehold, ranking as personal property. Freehold estates are estates of inheritance, or estates not of inheritance, the latter being for life only. A freehold E. may be held either in fee

simple or in fee tail, the first expressing the highest interest which a man can have in land, the latter implying limitations of some sort. Estates less than freehold are either held for a time specified at will, or by sufferance. An E. at will is terminated by either party by such notice as has been mutually agreed upon. An E. is held by sufferance when the occupant holds over after expiration of time. Estates are divided again into legal and equitable; again into estates in possession and estates in expectancy; and still again into estates in severalty, in joint tenancy, in common, and in coparcenary. An E. in severalty is one which has but a single owner; an E. in joint tenancy is one owned jointly by two or more individuals; an E. in common is one where separate but individual interests are held by different persons; an E. in coparcenary is one held by females in the land of an intestate ancestor.

ESTATES OF THE **REALM.** The three estates of the realm are not king, lords, and commons, as is popularly believed, but the lords spiritual, the lords temporal, and the commons. The ancient parliament of Scotland consisted of the king and the three estates of the realm, by which latter was meant—1st, the archbishops, bishops, abbots, and mitered priors; 2d, the barons, under which head were comprehended not only the nobility, but the commissioners of shires and stewartries; and 3d, the commissioners from the royal burghs. All these assembled in one house, and formed one meeting, by a majority of the votes of which all matters, whether legislative or judicial, were determined. Ersk. b. i. tit. 3, s. 2. Bell's *Dictionary*. See STATES.

ESTATE TAIL. See ENTAIL.

ES'TÉ (ancient *Ateste*), a t. in the Italian province of Padua, situated on the southern slope of the Euganean hills, 17 m. s.s.w of Padua. It is an old town, and has a decidedly Lombard appearance, many of the houses being supported by arches. It has several interesting buildings, among which the chief are the *Rocca*, or castle of E., with a grim-looking donjon tower, overhanging the town, and the church of *San Martino*, in the Romanesque style, surmounted by a campanile, which slopes as much as the leaning tower of Pisa. Both church and tower have been sadly disfigured by an attempt to modernize them. E. manufactures silk goods, saltpeter, hats, and earthernware, and has numerous silk-mills and whetstone quarries in the vicinity. Pop. about 6,000.

ES'TĒ, one of the oldest and most illustrious families of Italy, which, according to the historian Muratori, owed its origin to those petty princes who governed Tuscany in the times of the Carlovingians, and who were in all probability of the race of the Longobards. The first whose figure is more than a mere shadow is Adalbert, who died about 917 A.D. The grandson or grand-nephew of Adalbert, named Oberto, was one of the Italian nobles who offered the crown of Italy to Otho of Saxony. He is afterwards styled *Comes sacri palatii*, and appears to have been one of the greatest personages in the realm; he married a daughter of Otho's, and died about 972 A.D. In later times, the family of E. received from the emperors several districts and counties, to be held as fiefs of the empire. The family divided, at an early period, into two branches, the German and Italian. The former was founded by Welf or Guelfo IV., who received the investiture of the duchy of Bavaria from the emperor Henry IV. in 1070. The houses of Brunswick and Hanover, and consequently the sovereigns of Great Britain, also called Este-Guelfs, are descended from this person. In the 12th, 13th, and 14th centuries, the history of the E. family, as heads of the Guelf party, is interwoven with the destinies of the other ruling families and small republics of northern Italy. During this period, they first gained possession of Ferrara and the march of Ancona (1208 A.D.), and afterwards of Modena and Reggio (1288–89), and were widely celebrated as the patrons of art and literature. One of the most illustrious was Azzo VII., who encouraged Provençal troubadours to settle at his court at Ferrara, and also founded schools in that city. Alfonso I. (d. 1534) was equally distinguished as a soldier and a statesman, and was celebrated by all the poets of his time, particularly by Ariosto. His second wife was the notorious Lucrezia Borgia. His quarrel with the popes Julius II., Leo X., and Clement VII., was unfortunate, as an interdict was laid upon him for his adherence to the league of Cambray, and his papal fiefs declared to be forfeited. After the siege of Rome, in 1527, the duke was restored to his former possessions by Charles V. His successor, Ercole or Hercules II., who married Renate, daughter of Louis XII of France and Anne of Brittany, attached himself to Charles V. He and his brother, a dignitary of the Catholic church, were also liberal patrons of arts and sciences; the latter erected the magnificent villa d'Este at Tivoli. The next prince, Alfonso II. (d. 1597), would have been noways inferior to the preceding but for his immoderate love of splendor, his inordinate ambition, and the cruelty he displayed toward the poet Tasso, whose eccentricities, however, it must be confessed, were enough to try the patience of any reasonable mortal. Alfonso IV., who flourished in the latter half of the 17th c., was very fond of the fine arts, and founded the Este gallery of paintings. *Rinaldo* (d. 1737), by his marriage with the daughter of the duke of Brunswick-Lunenburg, united the German and Italian houses, separated since 1070. The male line of the house of E. became extinct on the death of Ercole III. in 1803, his possessions having been previously seized by the French invaders, and annexed to the Cisalpine republic. His only daughter married the archduke Ferdinand, third son of Francis, emperor of Austria. Their eldest son, Francis IV., by the treaty of 1814–15, was restored to the territories

which had belonged to his maternal ancestors, comprising the duchy of Modena; and, on his mother's death, obtained the duchies of Massa and Carrara. He was succeeded by his son, Francis V., 21st Jan., 1846. The connection which the family of E., like others of the small Italian principalities, had formed with Austria, gave it, of course, pro-Austrian sympathies, the result of which has been fatal to its popularity and dynastic existence. In 1860, the sentiment of Italian unity and independence, which for the previous 15 or 20 years had been steadily fostered by the policy of Sardinia, triumphed in a universal explosion of national feeling, which united the peninsula (with the exception of Rome and Venice) under the authority of Victor Emmanuel. Venice was added to the kingdom of Italy in 1866, and Rome became the capital in 1870.

ESTEL'LA, an ancient city of Spain, in the province of Navarre, is pleasantly situated on the left bank of the Ega, about 27 m. s.w. of Pamplona. It is a well-built, clean town, with several squares, and has, in the environs, a variety of agreeable promenades and pleasure grounds. It has two interesting churches, both old, and one of them, San Juan, a fine building with a very lofty tower. The manufactures are woolen and linen fabrics, brandy, and earthenware. A tolerable wine is made in the vicinity. E. has some trade in fruits, wool, hardware, and grain. Pop. about 6,000. Here Don Carlos was proclaimed king in Nov., 1833; and at E., again become a Carlist stronghold, battles were fought in 1874 and 1875. The city was taken by the government troops in Feb., 1876.

ESTE'PA, a t. of Spain, in the province of Seville, and 60 m. e.s.e. of the town of that name. It is, on the whole, well built; has several squares, and numerous religious edifices, among which are the churches of Santa Maria and San Sebastian; the former, a noble specimen of Gothic, having three naves, and a richly ornamented interior. It has manufactures of coarse cloth, baize, and oil, with a trade in grain, fruits, oil, brandy, wool, and cattle. In the vicinity are marble and building-stone quarries. Pop. 7,389.

ESTEPO'NA, a maritime t. of Spain, in the province of Malaga, and 25 m. n.n.e. of Gibraltar. It is well and regularly built; its streets wide, clean, and well paved. It supplies Gibraltar with fruits and vegetables; and its chief industrial features are its fishing, linen-weaving, and manufactures of leather. Pop. 9,400.

ESTERHAZY, an ancient Hungarian family, afterwards raised to the rank of princes of the empire, the representative of which is at present the richest landed proprietor in Austria. The family divided into three main branches—the Esesznek, Altsohl or Zolyom, and Forchtenstein lines. A descendant of the last family, Nicholas de E., born in 1765, traveled over a great part of Europe, and resided for a considerable time in England, France, and Italy. He founded the splendid collection of pictures at Vienna. He also made a choice collection of drawings and engravings. When Napoleon, in 1809, entertained the notion of weakening Austria by the separation of Hungary, he made overtures to prince E. respecting the crown of Hungary, which, however, were declined. The great Haydn composed most of his works at the court of prince Nicholas. His son, prince Paul Anton d'E., born in 1786, entered at an early age on a diplomatic career. After the peace of Vienna, he went as ambassador to the court of Westphalia. From 1815 to 1818, he represented the Austrian government at London. He filled the same office between 1830 and 1838, and distinguished himself by his diplomatic tact and ability. In 1842, he returned home, and continued to exert himself in the cause of political and literary progress. In Mar., 1848, he became minister of foreign affairs, in the cabinet presided over by Batthyani; but when the struggle between Austria and Hungary broke out, he exhibited more prudence than heroism by retiring from public affairs altogether. He died in 1366. The hereditary prince, Nicholas Paul Charles E., born 25th June, 1817, married lady Sarah Villiers, daughter of the earl of Jersey.

ESTHER (the word signifies "the planet Venus") is the Persian name of Hadassah, daughter of Abihail, the son of Shimei, the son of Kish, a Benjamite. She is represented in Scripture as an orphan, and as having been brought up by her cousin Mordecai, an officer in the household of the Persian monarch Ahasuerus. Her history, as recorded in the book of E., is well-known and extremely interesting. When the misconduct of Vashti had cost her her "royal estate," all "the fair young virgins" of the kingdom were gathered together, that Ahasuerus might choose a successor. He selected Hadassah, who received the name of E. on account of her loveliness. The great event of her life was the saving of her Jewish countrymen from the horrors of that universal massacre planned by the malice of Haman, and consented to by the thoughtless cruelty of an oriental despot. The details of this event are too familiar to require narration. It is sufficient to say that E.'s success was signal; and the feast which she and her cousin Mordecai appointed in memory of their deliverance—viz., the feast of Purim (i.e., of Lots), is, in consequence, celebrated with great enthusiasm. E. is not mentioned in profane history, whence it has been inferred by some that she was not exactly the *wife* of Ahasuerus (Xerxes), but rather the favorite of his harem, to which she undoubtedly belonged; for, as we read (ii. 8), E. was consigned "to the custody of Hegai, keeper of the women." This hypothesis is rendered probable by the fact, that the Persian kings did not choose wives from their harem, but from the principal Persian families, or else from the daughters of foreign potentates.

ESTHER, BOOK OF, one of the very latest of the canonical works of the Old Testament, and commonly, but without a shadow of evidence, supposed to be written by Mordecai or Ezra. This is the view of Abenesra, Clement of Alexandria, Augustine, Gerhard, and others. The Talmud assigns the authorship to the members of the great synagogue, a semi-mythical body, who are made use of by Jewish rabbis and Christian divines as a sort of *Deus ex machina* to solve every difficulty. According to the opinions of the most learned and unprejudiced critics, the date of its composition must be placed after the downfall of the Persian monarchy. The language is much later than that of Ezra and Nehemiah, and the fact of occasional explanation of Persian customs fits the period of the Seleucidæ better than an earlier one. The Hebrew text is that which has been followed in the English version; but the Septuagint is full of late interpolations and additions by Alexandrian Jews. The book is held in the highest reverence by the Jews; so much so, that Maimonides declared that, in the days of the Messiah, every Jewish scripture would be forgotten except the book of Esther and the Pentateuch. The book is not written in a theocratic spirit, like the rest of Jewish literature. Nothing is directly attributed to God; in fact, his name is not once mentioned. Neither is there the remotest trace of religious feeling of any kind. Luther, in his usual off-hand hasty way, expressed his contempt for the book, in spite of the admiration which the Jews bestowed on it, censuring it for its "heathenish extravagance," and declaring that, in his judgment, it was "more worthy than all of being excluded from the canon." The absence of all recognition of God, perplexed some of the ancient Jewish commentators, who therefore invented the hypothesis, that the book was originally a part of the Persian chronicles, probably executed by Mordecai; and that, being intended for the heathen, the sacred name was wisely left out!

ESTHER, BOOK OF, records events in Jewish history belonging to the interval of nearly 60 years that elapsed between the sixth and seventh chapters of Ezra. It has always been accepted by the Jews as canonical, and by many of them is esteemed worthy to be classed with the Pentateuch itself. Among Christians some have questioned its canonical authority, because it does not mention even the name of God, and because, as they say, it breathes a spirit of national pride and of revenge. To these objections it has been replied that, although the name of God does not appear, his providence is, in fact, exhibited, and the advantage of prayer and faith is shown; and that the traits of character ascribed to both Persians and Jews of that day are in strict accordance with history. While the book may be reasonably defended on these grounds, the defense appears much more triumphant on the hypothesis, which many advance, that the whole narrative is a transcript from the records of the Persian court which Esther or Mordecai obtained from the king. When it is read with this idea in mind, new light is poured on it. Everything in it is seen to be stated according to the Persian view, and the book bears the same relation to the Bible as the decrees of Nebuchadnezzar, Cyrus, and Darius recorded in the books of Daniel and Ezra. According to this view the book itself is not to be regarded as inspired, and no part of it need be defended as if it were. It exhibits Persian luxury, despotism, and caprice, as well as traits of Jewish character that are not to be praised. If any ask, "What, then, is inspired about the book?" the answer is that the direction to place it in the canon of Scripture was inspired; just as the direction to record Satan's words to Eve and to Christ was inspired, although the words themselves were blasphemous and false. That this historical narrative should have a place in Scripture was important on many accounts, one of which alone (capable of being rightly estimated only by the Divine mind) was sufficient to require it, viz., that the interposition of God's providence to save the Jews when they were in imminent peril of being exterminated might be shown to the world. That, without this interposition, the line of human descent from which the Messiah was to spring would, in all probability, have been cut off, *links the book of Esther into the unity of the Scriptures by which they all refer to Christ.* And as the Passover, observed by the Jews throughout their generations, is the memorial of their exodus from Egypt, so the feast of Purim, likewise observed by them to this day, commemorates their deliverance through Esther the queen.

Apocryphal Additions to the Book.—In the Septuagint version of E. there are six important passages, having no Hebrew original, inserted at different points of the narrative, and forming with the rest a well digested whole. They were probably designed to meet the objection that the book did not contain the name of God, and to make his agency in the deliverance of his people more prominent and clear. In the 4th c. after Christ, when Jerome translated the book into Latin, he gave first the parts contained in the Hebrew, and placed the six others by themselves, adding marks and explanations by which their design and connection might be known. But in subsequent editions of the Vulgate these explanations were removed and the additions printed as supplemental chapters of the original book. This plan, which greatly impairs their significance and force, has been followed in the English version of the apocryphal parts, where they are called "*The rest of the chapters of the book of Hester which are found neither in the Hebrew nor in the Chaldee.*"

ESTHO'NIA, called by the inhabitants themselves *Wiroma* (i.e., the border-land), a Russian government, and one of the Baltic provinces (q.v.), extends immediately s. of the gulf of Finland; has an area of 7,787 sq.m., and a pop. (1870) of 323,961. It was

conquered (1182–1241) by the Danes, who sold it to the Teutonic knights in 1346. It came into the possession of the Swedes in 1561, but was taken from them by Peter the great in 1710; and by the treaty of Nystadt was finally secured to Russia in 1721. One third of the entire surface, which is in general flat, is under cultivation, and produces great quantities of rye and barley; the remaining two thirds are chiefly composed of sandy tracts and marshes, strewn in many places with large blocks of granite; there are also extensive forests of birch and pine. The government of E. is divided into four circles; its principal town is Reval or Revel (q.v.).

The inhabitants are divided into Esthlanders and Esths. The former are a mixture of Swedes, Germans, and Russians, and comprise the nobles and the town-populations. The latter belong to the Finnish race, and are the original possessors of the soil. Their language is soft and musical, and is divided into two leading dialects, that of Revel and that of Dorpat. They also possess a literature rich in splendid national songs. See Neus, *Esthnische Volkslieder* (Reval, 1850–51). They are industrious, kind-hearted, and in the main religious and attached to the Protestant doctrines. A great part of Livonia is peopled with Esths, the entire number of whom in the Baltic provinces is about 650,000.

ESTIENNE, or ETIENNE. See STEPHENS.

ESTILL, a co. in central Kentucky divided into nearly equal parts by Kentucky river; 320 sq.m.; pop. '70, 9,198—599 colored. It has abundant water-power, and mines of iron and coal, with hilly but fertile soil. Co. seat, Irvine.

ESTOC (Italian), a small dagger worn at the girdle, called in Elizabethan times a tucke.

ESTOILE, or STAR, in heraldry, differs from the mullet (q.v.) by having six waved points; the mullet consisting of five plain points.

ESTOPPEL, an impediment or bar to a right of action, arising from a man's own act. It is called an E. or conclusion, because a man's own act or acceptance stoppeth or closeth up his mouth to allege or plead the truth.—*Co. Litt.* 352 a. Estoppels are of three kinds—1. By matter of record, where any judgment has been given in a court of record, the parties to the suit are estopped from afterwards alleging such matters as would be contradictory to the record. 2. By matter in writing. Thus, a party who has executed a deed will be precluded from afterwards denying, in any action brought upon that instrument, the fact of which it is evidence. 3. By matter in *pays*, as by livery, by entry, by acceptance of rent, etc.—by any of which acts a man is barred from pleading anything to the contrary. The principle of estoppel is that what a man has once solemnly alleged is to be presumed to be true, and therefore he should not be suffered to contradict. The doctrine of estoppel prevails in America as well as in England. In Scotland also, the same principle is recognized, under the name of personal exception (q.v.).

ESTO'VER (Fr. *estoffer*, to furnish), an incident to the estate of a tenant for life or for years. It is the right which the tenant has to make use of the wood on the estate for certain definite purposes. Estovers, or *botes* (Saxon), are of three kinds—housebote, which is twofold—viz., *estoverium adificandi et ardendi*, a right to wood for fuel and repairs of the house, ploughbote, *estiverium arandi*, wood for plows and carts; and haybote, *estiverium claudendi*, wood for repairing hedges and fences.—*Co. Litt.* 41 b.

ESTRAYS', or STRAYS, domestic animals found wandering about without apparent home or known owners. In England the owner has a year and a day in which to claim such cattle, and the proprietor of the inclosure where they are found must make proclamation in a church and in market-towns. When these conditions are fulfilled they belong to the proprietor of the inclosure. The law of estrays varies in the different states of the American union. In some, after an estray has been advertised and kept for a certain time it is sold to pay the charges of advertising and keeping, any balance going to the town treasury. Cattle at large contrary to regulations, or breaking into growing crops and doing damage, can in most states be sent to a pound, and after a short time sold to pay damages and expenses.

ESTREAT' (Lat. *extractum*), in English law, a true extract copy or note of some original writing or record, and specially of fines or amercements, as entered in the rolls of a court, to be levied by bailiffs or other officers. When, however, it is applied to a recognizance (q.v.), it signifies that the recognizance itself is estreated, or taken out from among the other records, and sent to the exchequer.—Blackstone, *Comm.* iv. 253. If the condition of a recognizance be broken, the recognizance is forfeited; and on its being estreated, the parties become debtors to the crown for the sums in which they are bound.—Archbold, *Crim. Practice*, 78. The court of exchequer has power over penalties and forfeitures incurred at assizes, and can discharge or compound them at its discretion; but that court has no power over recognizances forfeited before justices of the peace.

ESTREES, GABRIELLE D', 1571–99; a beautiful French girl who, at the age of 16, became a favorite of Henry III. and about the same time of cardinal De Guise and the dukes of Bellegarde and Longueville. In 1590 she met Henry IV soon after his great

victory at Ivry. He became desperately enamored, but she did not immediately discard her old lover, the duke of Bellegarde. Henry gave her a husband in one M. de Liancourt, but soon afterwards divorced them and raised her to the rank of marchioness, and in 1595 to duchess of Beaufort. Henry lavished riches upon her, and when she died she was the owner of a dozen estates near Paris. The king desired to divorce his lawful wife and marry her, but Sully had sufficient influence to delay the matter until the death of Gabrielle. This event happened suddenly, and not a few persons suspected foul play. She had borne the king three children.

ESTRÉMADURA, next to Alemtejo, the largest province of Portugal, has an area of 6,907 sq.m., and, including the capital, Lisbon, contained in 1874, 903,465 inhabitants. The greater part of the country is hilly, but the hills do not attain any great elevation. To the w. of the estuary of the Tagus are the granite mountains of the Serra da Cintra, varying from 1500 to 1800 ft in height, and terminating in the Cabo de Roca. To the s. of the Tagus are barren moors, partly broken by morasses, and the limestone chain of Arrabida, rising to a height of 1000 ft. and terminating in the Cabo de Espichel. Many districts are extremely fertile, others are barren and uncultivated. The Tagus, which is only navigable as far as Abrantes, receives the waters of the Zezeres, the Sorraya, and the Canha, and is strewn with islands at its mouth. The chief productions of the country are wine, oil, fruits, corn, and cork; but even the sandy plains are covered with cistus, rosemary, myrtles, and other flowering and fragrant plants. The breeding of cattle is not much attended to. The minerals are marble, coal, and sea-salt. This province has been frequently visited by earthquakes.

ESTRÉMADU'RA, previous to the new distribution of the country, a province of Spain, situated between Portugal and New Castile, and watered by the Tagus and the Guadiana. It is bounded on the n. by Leon, on the s. by Andalusia, and, since 1833, has been divided into the two provinces of Badajos and Caceres. It has an area of 16,554 sq.m., and contained, in 1870, 734,377 inhabitants. Although a continuation of the high table-land of New Castile, E. is not, like it, a uniform plain, but is mountainous on the n. and s., and is well watered, the slopes of the hills being covered with wood, and the valleys with rich grass. Notwithstanding the fertility of the soil, the land has lain desolate and uncultivated since the expulsion of the Moors in the 13th century. This is chiefly to be attributed to the Mesta, or right of pasture, which causes the land to be regarded as the common property of the possessors of flocks. The breeding of goats, swine, horses, asses, and mules is much attended to. Silk and honey form no inconsiderable branches of trade. Corn is still imported. The mines, which were formerly very productive, are no longer wrought. Commerce is confined almost entirely to a contraband trade with Portugal. The inhabitants are poor, and, from the want of roads, isolated from the rest of Spain, and consequently in a low state of civilization. They make excellent soldiers, however, and have produced a series of brave *conquistadores* and generals.

ESTREMOZ', a fortified town of Portugal in the province of Alemtejo, is 23 m. n.e. of Evora, and about the same distance e. of Elvas. It is built round the base of the hill on which its once formidable castle, erected in 1360, is placed. It now ranks as the fourth or fifth stronghold in Portugal. E. is famous for its manufactures of earthenware; its jars, which are made of a porous clay, and have the property of keeping water singularly cool, are of elegant shape, and are used all over the peninsula. The earthenware manufactures of E. seem to have continued unchanged since Roman times, as until the present day the forms into which the jars are cast are purely classical. In the neighborhood of E. is a marble quarry. Pop. 6,500.

ESZEK, a royal free town of Slavonia, on the right bank of the Drave, 12 m. above its confluence with the Danube, is the administrative capital of the "Kingdom," and the most prosperous trading-town of Slavonia. Since the Drave began to be navigated downwards to E. by steamers, the town has driven a prosperous trade in corn, wool, pigs, iron, deals, wine, and flax. The fortress of Eszek, known in Roman times under the name of Mursia, is protected by a fort situated on the left bank of the Drave. In the fortress, the commander's dwelling and the town-house, and in the lower town the county buildings, are specially worthy of mention. During the Hungarian revolution, the town was at first held by count Casimir Batthyányi, but capitulated, after a siege of several weeks, to the Austrian general, baron Trebersberg. Pop. '69, 17,247, more than one half of whom are Roman Catholics, the rest being Greek Catholics, Protestants, and Jews.

ESZ'TERHÁZY. See ESTERHÁZY, *ante.*

ESZ'TERHÁZY, NICHOLAS IV., Prince ESZTERHÁZY DE GALANTA, 1765–1833; b. Hungary; a traveler, and a liberal patron of the arts and sciences, the founder of a valuable picture-gallery in his castle in Vienna. His country seat he transformed into a temple of music, and erected there a mausoleum to Haydn. It is said that Napoleon, with a view of weakening Austria, offered the crown of Hungary to Eszterhazy, who firmly refused it.

ESZ'TERHÁZY, NICHOLAS JOSEPH, Prince ESZTERHÁZY DE GALANTA, count of Forchtenstein, 1714–90; grandson of Paul IV., the head of the third branch of the house.

He was distinguished as a soldier in Silesia, but is better known as a patron of art. He served as ambassador at several European courts.

ESZ'TERHÁZY, PAUL IV., Prince ESZTERHÁZY DE GALANTA, head of the third branch of the house of Eszterházy, 1635–1713; he was an Austrian field-marshal, and distinguished in the wars with the Turks. In 1687, he was made a prince of the Holy Roman empire, in reward for his great services in defending Vienna and Ofen from the Turks.

ESZ'TERHÁZY, PAUL ANTHONY, Prince ESZTERHÁZY DE GALANTA, 1786–1866; son of Nicholas IV.; for the greater part of his life a diplomatist. He was ambassador of Austria at Rome twice, once at Dresden, and once at London. In the Hungarian uprising of 1848, he was minister of foreign affairs. After the suppression of the revolution he retired from public life.

ETAH, a district in British India, included in the division of Agra, s. of the Ganges; between 27° 20′ and 28° n., and 78° 30′ and 79° 20′ e.; 1512 sq.m.; pop. '72, 703,527, about seven eighths Hindus. It is chiefly an elevated alluvial plain, with some fertile land. The productions are wheat, barley, cotton, sugar-cane, opium, indigo, etc. There are two harvests in the year. The manufacture of indigo is a leading industry. This region was the seat of a primitive Aryan civilization.

ETAMPES (anc. *Stampæ*), a t. of France, in the department of Seine-et-Oise, is situated 32 m. s.s.w. of Paris, on the Orleans railway. It consists mainly of one street, about 4 m. long. The chief buildings are the ecclesiastical edifices. E. possesses a public granary, capable of containing 1400 tons of wheat. In and around E. there are upwards of 40 flour-mills, constantly employed in providing for the Paris market; considerable quantities of garden-stuff are sent from this neighborhood to the capital. Pop. '76, 7,399.

ÉTAMPES, ANNE DE PISSELEU, Duchesse d', 1508–76; mistress of Francis I. of France, over whom she had very great influence. But she was exceedingly jealous of Diana of Poictiers, the mistress of the dauphin (afterwards Henry II.), and under this passion betrayed state and army secrets to Charles V. After the death of Francis she was banished from court.

ETANG DE BERRE, a salt lake of France, in the s. of the department of Bouches-du-Rhone, communicates with the sea by a narrow channel, called Tour-le-Bouc, and is 11 m. long by 9 broad at its widest part. This lake contains great quantities of eels and other fish. Salt-works are in operation on its banks.

ETAWAH, a t. of the Doab, stands near the left bank of the Jumna, about 70 m. below Agra, in lat. 26° 46′ n., and long. 79° 4′ east. Though it is, on the whole, a dreary and mean place, yet it presents some remains of ancient grandeur, more particularly many of those ghats or flights of stairs which facilitate the approach to the river for the purpose of ritual ablution. It contains (1872) 30,549 inhabitants; and its prosperity, such as it is, is owing chiefly to its position at the junction of the two roads which lead to Agra from Cawnpore and Calpee.

ETA'WAH, or ITAWA, the district of which the above town is capital, belongs to the lieutenant-governorship of the North-west Provinces. It lies entirely in the basin of the Jumna and almost exclusively within the Doab, stretching in n. lat. from 26° 21′ to 27° 9′, and in e. long. from 78° 46′ to 79° 49′, and containing 1691 sq.m., and (1871) 668,641 inhabitants. The district was at one time famous for the murderous fanaticism of the Thugs, 67 corpses of their strangled victims having been found in the wells during a single year.

ETCHING. See ENGRAVING.

ETCHING UPON GLASS. See GLASS.

ETCHEMINS, formerly an Indian tribe in Maine, now represented by the Penobscots and the Passamaquoddies. They dwelt between the Micmacs and the Abenaquis tribes. There are about 1000 still left. Nearly all are Roman Catholics.

ETCHMIADZIN', EDCHMIADZIN, or ITSMIADZIN, a t. and monastery in the Russian government of Erivan, famous as the seat of the catholicus, or primate of the Armenian church. It is situated in the plain of the Aras or Araxes, about 2,985 ft. above the sea, 12 m. w. of Erivan, and 30 m. n. of Mt. Ararat. The monastery comprises an extensive complex of buildings, and is surrounded by brick walls 30 ft. high, which, with their loopholes and towers, present the appearance of a fortress. Its architectural character has been considerably impaired by additions and alterations in the modern Russian style. On the w. side of the quadrangle is the residence of the primate; on the s. the refectory, built by the catholicus Abraham, 1730–35; on the e. the lodgings for the monks; and on the n. the cells. The cathedral is a small but fine cruciform building, with a Byzantine cupola at the intersection, a large tower at the western end, and a smaller tower above each wing of the transepts. Of special interest is the porch, built of red porphyry, and profusely adorned with sculptured designs somewhat similar to those of Gothic architecture. The interior of the church is decorated with Persian frescos of flowers, birds, and scroll-work. It is here that the catholicus confers episcopal consecrations by the sacred hand of St. Gregory; and here every seven years he prepares with great solemnity the holy oil which is to be used throughout the churches

of the Armenian communion. Of the numerous relics, the chief are the head of the spear which pierced the Savior's side; a piece of Noah's ark, presented by an angel to St. James of Nisibis; and a piece of the true cross. Outside of the main entrance are the alabaster tombs of the primates Alexander I. (1714), Alexander II. (1755), Daniel (1806), and Narses (1857); and in hospitable contiguity a white marble monument erected by the East India company to mark the resting-place of sir John Macdonald, who died at Tabriz in 1830, while on an embassy to the Persian court. The library of the monastery is said at one time to have contained 15,000 volumes, and in spite of depredation and neglect, it still remains a rich storehouse of Armenian literature. Among the more remarkable manuscripts are a copy of the Gospels in a massive binding of carved ivory, dating from the 10th or 11th c., and three Bibles of the 13th c., one of which had belonged to Aytoun II., king of Armenia. A type-foundry, a printing-press, and a bookbinding establishment are maintained by the monks, who publish a weekly Armenian newspaper called *The Ararat*, and supply religious and educational works for their co-religionists. The number of inmates in the monastery varies considerably. In 1834, there were 50 monks and 13 bishops and archbishops; and in 1872, there were 5 bishops and archbishops, 20 monks, and 25 novices. The revenue, estimated at $50,000, is derived from the conventual domains, which, though much less extensive than formerly, still comprise not only a number of estates, but five villages, presented or rather restored by the Russian emperor. The catholicus has an annual income of $7,500. To the e. of the monastery is a college and seminary of modern erection. At the distance of about half a mile stand the churches of St. Rhipsime and St. Gaiana, two of the early martyrs of Armenian Christianity; the latter is of special interest as the burial-place of all those primates who are not deemed by the synod worthy of interment beside the cathedral. From a distance the three churches form a striking group, and accordingly the Turkish name for Etchmiadzin is simply "Utch-Kilissi," or the "Three Churches:" a fourth of less importance is ignored. The town of Etchmiadzin, or as it should be called Vagharshapat, contains about 8,000 inhabitants, but has long ceased to be of any individual importance. According to Armenian historians, it dates from the 6th c. B.C., and takes its name from king Vagarsh, who, in the 2d c. A.D., chose it as his residence and surrounded it with walls. According to the legend, the great apostle of Armenia, St. Gregory the illuminator, having seen the Savior descend in a flood of light in the neighborhood of the palace, was ordered by an angel to erect a church on the spot. He observed the divine command in 309, and gave the building the commemorative name of "Edch-Miadzin," or "Descended the Only Begotten." In 344, Vagharshapat ceased to be the Armenian capital, and in the 5th c. the patriarchal seat was removed to Tovin. The monastery was founded by Narses II., who ruled 524–33; and a restoration was effected by Gomidas in 618. At length, in 1441, the primate George or Kevork brought back the see to the original site, and from that day to the present time Etchmiadzin has been the center of the Armenian church. In the Russo-Persian war of 1827, though the monastery was declared neutral territory by both belligerents, it was occupied by Russian troops. (*Encyclopædia Britannica*, 9th ed.)

ETE'OCLES and POLYNICES, sons of Œdipus and Jocasta, cursed by their father for shutting him up in prison. In order to prevent the fulfillment of his prediction that they would engage in fratricidal strife for the throne, they agreed to reign on alternate years. Eteocles, the elder, began, but when his year was up he refused to vacate. Then Polynices, who had married a daughter of Adrastus, king of Argos, headed the famous expedition of the seven against Thebes. The brothers met in single combat and both were slain.

ETESIAN WINDS, a name given by the Greeks to the winds that prevailed for six weeks in summer over the countries near the Mediterranean. They started from the desert regions of torrid Africa, and were hot and dry, but in crossing the Mediterranean they became charged with moisture, and on reaching the n. and e. shores precipitated much-needed rain.

ÉTEX, ANTOINE, b. Paris, 1806; a sculptor, pupil of Dupaty, Pradier, and Ingres. He has traveled in Italy, Algiers, Germany, and England. He also excels in painting, and has published works on the two arts.

ETH'ELBALD, d. 860; King of Wessex; son of Ethelwulf, king of the Anglo-Saxons. Ethelbald formed a conspiracy to seize his father's throne, but was dissuaded on being given the rule of Wessex only. He married his young stepmother, Judith, daughter of the king of France, but the displeasure of the church and of the people compelled them to separate, and she went into a French convent, from which she eloped with Baldwin of the iron arm, and from their union came Matilda, wife of William the conqueror. The reign of Ethelbald was uneventful.

ETH'ELBERT, King of Kent, and fourth in direct descent from the great Hengist, was b. in the year 552, and succeeded to the throne in about the eighth year of his age. The representative of the first Saxon king who ruled in England, and envious on that account of the title of Bretwalda, then enjoyed by Cealwin of Wessex, E. rashly undertook an expedition against that king in 568, a venture which, had he known the

extent of country covered by the West Saxons, he would probably never have made. The rival kings met at Wibbandune, now Wimbledon, in Surrey, where a great battle took place, resulting in the defeat of Ethelbert. This is recorded as being the first battle that ever occurred between Anglo-Saxon sovereigns. Taught by disaster and danger, E. became more prudent. His subsequent schemes were more successful, and, about the year 590, he was acknowledged as Bretwalda of the Saxon octarchy, a dignity which he maintained to the close of his reign and life. In 570, E. married Bertha, a Frankish princess. The lady was a Christian, and it is said had stipulated, as a condition of her marriage, that she should be allowed, after her arrival in Kent, to practice her own religion. Her amiable piety had completely disarmed E. of all violence against the Christian religion long before the most important event of his life took place, viz., the formal introduction of Christianity into his kingdom. This was effected by means of the ministrations of St. Augustine, who was sent to Britain by pope Gregory, and who landed in Kent in 596. In the following year the king himself was converted, and Christianity established among the hitherto pagan Saxons. After his conversion and baptism, he founded the bishopric of Rochester, and, in concert with his nephew Sebert, king of Essex—who also had been converted—erected the church of St. Paul's in London. He died in 616.

E. is also distinguished as the author of the first written Saxon laws. These are the *Dooms*, as they are called by Bede, "which he established with the consent of his Witan in the days of St. Augustine." They are in the Saxon language, and are the earliest written laws that exist in any modern tongue.

ETH'ELBERT, d. 866; King of the Anglo-Saxons. He was a son of Ethelwulf and ruled all the kingdom except Wessex, succeeding to that portion also on the death of his brother Ethelbald. It was during Ethelbert's reign that the Northmen, under the famous Ragnar Lodbrok, ravaged Kent, sacked the city of Winchester, and threatened London.

ETH'ELRED, or ÆTHELRED, I., d. 871; King of the Anglo-Saxons, succeeding his brother Ethelbert. He assumed the rule in 866, and his short reign was greatly disturbed by the forays of the Northmen under the sons of Ragnar Lodbrok. Ragnar had been captured and thrown into a den, where he was stung to death by serpents. His sons vowed vengeance. They seized the city of York and killed the princes who had captured their father; passed the winter in Nottingham, marched into East Anglia, destroyed several monasteries and nunneries, and killed Edmund, the king of East Anglia, of whom the church made a martyr. They were at last defeated by Ethelred, assisted by Alfred (afterwards the great), but two weeks afterwards they defeated Ethelred and Alfred at Basing. Ethelred died of a wound and Alfred became his successor.

ETHELRED, or Æ'THELRED, II., THE UNREADY, 968–1016; King of the Anglo-Saxons; son of Edgar and Elfrida. Careless of everything save his immediate comfort or whim, he and his kingdom were managed by unworthy favorites. In his time the Danes made many conquests in England, and forced Ethelred to purchase peace, to do which he laid upon his people the oppressive tax known as the "Danegeld," which was enforced at times for nearly 200 years. The Danes ravaged all the country around the river Humber, and in 994, aided by Olaf king of Norway, they laid siege to London, but the city was saved through the valor of its people. The Northmen then attacked the southern coasts, but they were hindered by the defection of Olaf, who embraced Christianity and became Ethelred's ally. In the last three years of the 10th c., the Danes ravaged Kent, Sussex, and Wessex. In 1000 the Anglo-Saxon king, disregarding the enemy at home, invaded Normandy, where he was disastrously defeated; but he made a treaty, and married Emma, the daughter of the duke of Normandy. In the spring, he concluded a treaty with the Danes; but, on pretense that they were plotting treachery, the next winter he ordered the murder of all the Danes in England. Among the victims was Gunold, sister of Swend, king of Denmark. Swend was swift in his revenge, and for four years his army ravaged almost at their pleasure in England. In 1007, Ethelred again bought peace for a large sum of money. In 1009, Ethelred collected the "largest fleet that had been seen in the reign of any king," with the intention of driving the Danes from the sea; but the fleet was almost wholly destroyed by a storm; the Danes renewed their ravages, and the English suffered many defeats, until another peace was purchased for money in 1012. The next year Swend, with the largest fleet he had ever collected, sailed up the Humber and marched towards London; but he met such strong resistance that he gave up the plan of attacking the city, and turned off to Bath, where he was proclaimed king of England by the people, who were weary of Ethelred's incompetency and exactions. London soon acknowledged Swend, and the deposed Anglo-Saxon king fled to Normandy. Swend died in the spring of 1014, and Ethelred was re-called on promising to rule better in the future. In the same year he defeated Cnut (Canute), son of Swend, but in 1015 Cnut ravaged a large territory, and was about to attack London when Ethelred died.

ETHELREDA, SAINT, a daughter of the king of the East Angles, in the 7th c. canonized for her saintly virtues, and whose festival in the calendar is Oct. 17. Her name was popularly abbreviated or corrupted into St. Audrey. At a fair in the isle of

Ely, called after her St. Audrey's fair, it was customary to sell a common kind of lace, which came to be known as St. Audrey's lace. *Tawdry*, as applied to any inferior kind of frippery, is believed to be a corrupt use of the term St. Audrey.

ETH'ELWULF, or ÆTHELWULF, d. 858; King of the Anglo-Saxons, son of Egbert. Ethelwulf's reign was mainly occupied in wars against the invading Danes. In 855, E. made a journey to Rome, taking his youngest son (afterwards Alfred the great) to have him consecrated as his successor. In France he married Judith, a daughter of the king of the Franks (afterwards married to Ethelbald, her step-son). In consequence of the preferment of Alfred for succession, the eldest son, Ethelbald, planned a revolt, but was pacified on his father's giving him the kingdom of Wessex. See ETHELBALD.

ETHER (otherwise called ETHYLIC ETHER, VINIC ETHER, and SULPHURIC ETHER) is prepared from alcohol by the action of sulphuric acid at an elevated temperature. On the small scale the apparatus which may be employed for the purpose is the retort and receiver, into which a mixture of equal weights of spirits of wine, or rectified spirit and oil of vitriol, or, by volume, 2 of alcohol and 1 of sulphuric acid, are placed, and heat being cautiously applied, a liquid distils over, which consists of ether and water. In a short time the contents of the retort begin to blacken, and the operation must be stopped or the distillate will become contaminated with sulphurous acid. On the large scale a modification of the process is carried on, which renders it theoretically a "continuous process," though, practically, there is a limit to the amount of ether distilled over.

The conversion of alcohol (C_4H_5O,HO) into ether (C_4H_5O) and water (HO) by oil of vitriol ($HOSO_3$), was at one time considered to be due simply to the strong affinity of the oil of vitriol for water, which enabled it to take possession of the one atom of water, the elements of which form the only difference in the ultimate composition of alcohol and ether. This simple mode of explaining the process of etherification, however, does not acknowledge that the atom of water is not retained by the oil of vitriol, but is given off side by side with the E. in mechanical solution therewith. The theory of the process now generally accepted is too complex for introduction here.

E. is a colorless, transparent, volatile liquid of great mobility and high refractive power, and possessing a fragrant odor, and a fiery, passing to a cooling, taste. When pure, it has the specific gravity 720 (water = 1000) at 60° F., though the commercial specimens are never free from water and alcohol, and have the density 740. It boils at 94.8° F. (the commercial at 96°), and yields a very dense vapor, the specific gravity of which is 2586, as compared with air 1000. When reduced to a temperature of − 24° F., E. freezes. It volatilizes spontaneously when placed in an unconfined position, as in the palm of the hand, and vaporizes so quickly as to produce intense cold. Indeed, when water is covered with E., and the latter assisted in its evaporation by being blown upon, it escapes so readily as to reduce the temperature of the water to 32° F., when it freezes. It is very inflammable, burning with a yellow-white flame; and mixed with air or oxygen, it gives rise to a dangerous explosive mixture, and hence great care requires to be taken in its distillation to keep all lights and fires out of the room where the vapors are condensing. When E. is added to its own bulk of water, briskly agitated, and allowed to settle, the two liquids appear to separate again; but it is found that the E. has taken up one-eighth of its volume of the water, whilst the latter has dissolved the same quantity of ether. It is readily miscible with alcohol in all proportions. E. is one of the best solvents for the oils and fats, and hence is employed in analysis for the solution and separation of the oils from other organic matters, as in the analysis of oil-cakes, etc. It is also a good solvent of iodine, sulphur, phosphorus, and of strychnine, and other alkaloids, as well as of corrosive sublimate, and other salts.

E. is useful in the preparation of freezing mixtures, and the mixture of E. and solid carbonic acid gives rise to the lowest temperature which has as yet been attained. When inhaled by man and the lower animals, E. first produces stimulating and intoxicating effects, but afterwards it gives rise to drowsiness, accompanied by complete insensibility, which entitles E. to be regarded as an important anæsthetic agent; and, indeed, for some time it was the only agent used for producing anæsthesia (q.v.) in operations, but has been entirely superseded by the employment of chloroform.

E. enters into combination with many acids, forming compound ethers, possessing great fragrancy; the more important of which are given in the following table:

Acetic Ether	$C_4H_5O,C_4H_3O_3$	
Butyric Ether	$C_4H_5O,C_8H_7O_3$	Pine-apple Oil.
Caproic Ether	$C_4H^5O,C_{12}H_{11}O_3$	Essence of Melons.
Rutic Ether	$C_4H^5O,C_{20}H_{19}O_3$	Essence of Melons.
Pelargonic Ether	$C_4H_5O,C_{18}H_{17}O_3$,	Essence of Quinces.
Œnanthic Ether	$C_4H_5O,C_{14}H_{13}O_3$,	Wine Oil.

There are other ethers, in which ordinary E. is not one of the members, as

Amyl Acetic Ether	$C_{10}H_{11}O,C_4H_3O_3$,	Jargonelle Pear Oil.
Amyl Valerianic Ether	$C_{10}H_{11}O,C_{10}H_9O_3$,	Apple Oil.
Methyl Salicylic Ether	$C_2H_3O,C_{14}H_5O_5$,	Oil of Winter Greens.

ETHER, sometimes ÆTHER, the name given to the medium which is assumed in astronomy and physics as filling all space. It was shown by Newton, that if light consisted of material particles projected from luminous bodies, these must move *faster* in solids and liquids than in air, in order that the laws of refraction might be satisfied in their motions. Huyghens, on the other hand, showed, that to account for the same laws on the supposition that light consisted in the undulatory motions of an elastic medium, it must move more *slowly* in solids and fluids than in gases. Fizeau and Foucault have lately, by different methods, measured these velocities relatively, and have found Huyghens's prediction to be correct. Light, then, consists in the vibratory motion of a medium, which must, of course, fill all space. This is called ether. As yet, we have no idea as to its ultimate nature; some of our greatest philosophers, even, have supposed that it may be of the class of ordinary gases, and that our atmosphere, for instance, is not finite in extent, but pervades, with greatly reduced density, all interplanetary and interstellar space. Many objections, however, may easily be raised against this supposition. Meanwhile, we may remark, that the mathematical theory of light, on the hypothesis of undulations, requires that the vibrating medium should possess properties more nearly allied to those of an elastic *solid* than those of a liquid or a gas. The E. being *required* for the explanation of the existence and the propagation of light, it becomes a matter of importance to inquire how many more of the physical forces may be referred to the same cause or medium. Radiant heat most certainly may, and, in all probability, gravitation, molecular actions, magnetic, electric, and electro-dynamic attractions and repulsions, are also to be thus explained. As to sensible and latent heat, electricity and magnetism themselves, the necessity is not so clear; but even these have been of late *almost* satisfactorily explained by the hypothesis of the all-pervading ether. See FORCE. In the article just referred to, a good deal more will be found with reference to this subject, and especially with reference to the impossibility of the E.'s consisting of air or other gases, which are made up of distinct and separated particles.

ETHER (*ante*). The ancients had a shadowy idea, or theory it may be called, in regard to the medium which we term cosmic, or luminiferous, ether. The ancient Greeks personified it, Æther being, according to Hesiod, the son of Erebus and Night, and the brother of Day. They also regarded this personification as the representation of the great force of the universe, as well as original matter, which, in a mysterious union with this force, evolved the worlds. The Orphic hymns speak of Æther as the soul of the world, the animator of all things, the great principle of life, the divine essence. The children of Æther and Day were the objects of the visible creation, the heavens with all their stars, the land, the sea. Æther was the lightest and the most active form of matter, and Day had the power of converting it into heavier and visible matter. It seems as though the human mind has the power, given it by the creator, of foretelling great truths afterwards to be demonstrated. Plato spoke of æther as being a form of matter far purer and lighter than air; so light that its weight cannot be ascertained because diffused through infinite space. It would at first appear surprising that the substance which Huyghens found it necessary to assume to demonstrate the laws of reflection and refraction, and particularly of double refraction, should not have been regarded by the greater portion of the scientific world as a reality, as a substance necessary for the performance of many physical phenomena. But Newton's emission theory of light, or, perhaps it may more correctly be said, his elaboration of the emission theory of Descartes, held the belief of the world for nearly a century and a half, and this theory did not require the supposition of such a medium, although both Newton and Descartes conceived of its existence. Huyghens's undulatory theory was so thoroughly founded upon the doctrine of an ether that its opponents were perhaps, in their opposition to his theory, insensibly led to ignore the existence of this medium; for the propagation of light by the emission of particles of matter needed no medium for them to pass through; they could pass through vacuous space, although there were some phenomena which seemed to suggest that the assumption of such a medium would aid in their explanation. But Huyghens's theory required the existence of the medium, although, strange as it may seem, the great mathematician Euler, an advocate of the doctrine of undulations, rejected the doctrine of an ethereal medium. Prof. Grove, a modern British scientist, in his essay on the *Correlation of Physical Forces*, offers the following arguments, here briefly stated, against the doctrine of a cosmic ether. The tendency that the particles of bodies have to fly off into space is so great that it has been impossible hitherto to cause an inclosed space to be void of ponderable matter. Gaseous matter has so strong a tendency to fly off into space that no part of the universe could, after a time, be free from its particles. Again, it must be assumed that light is lost in the interstellar spaces, because, if it were not so, there could be no night, all of the stars being suns. Now, an argument which chimes in with the doctrine of the correlation of physical forces, is that the light from these innumerable suns is transmuted into another force, and this requires the existence of matter in the spaces, such matter as would be furnished by the expansion into space of the aerial matter which envelops the different worlds. The strongest arguments in favor of the belief in a cosmic ether are that it allows of a perfect explanation of all the phenomena of radiation, refraction, diffraction and polarization of light, and that such explanation cannot be made without assuming the existence of such a medium. See HEAT AND LIGHT.

ETH'EREGE, or ETHERIDGE, Sir GEORGE, 1636-89; b. London; educated at Cambridge, and traveled in the continent, where he saw some of Molière's dramas. After the restoration of Charles II. he began to write for the stage, producing first *The Comical Revenge, or Love in a Tub*, which was highly successful. He was at once admitted to the circle of wits and poets of the time, and led a careless and somewhat loose life. By a questionable alliance with Mrs. Barry, the actress, he had one daughter, who died young. Among Etheridge's plays were *She Would if She Could*, and *The Man of Mode, or Sir Fopling Flutter*, in which the chief character was a portrait of Beau Hewit, the Brummel of the period, while he represented in other parts sir Charles Sedley, and also himself. But he fell to gambling and lost his fortune. Then he married a rich widow, and again had money. In 1686, he was appointed resident minister at Ratisbon, where it is said that while conducting a party of friends to the stairs after a banquet he fell over the banisters and broke his neck.

ETHICS, a word of Greek origin, meaning nearly the same thing as the more familiar term morals. The science, treating of the nature and grounds of moral obligation, and expounding our various duties, is called sometimes by the one term, and sometimes by the other. This is a subject wherein opinions so different from each other have been, and are still held, that a writer's task must lie first in explaining what are the chief points in dispute, and next in giving an account of the positions taken up by the opposing schools.

There are two distinct questions connected with the theory of morals. The first is the properly ethical question, and is, what is *the criterion of a moral act?* otherwise expressed as the *moral standard*—the circumstance determining an action to be *right*, and not *wrong*, nor simply indifferent as regards right and wrong. What determines us to single out some conduct as the subject of *moral approbation*, and other conduct as the subject of *moral disapprobation?* We consider murder, theft, breach of promises or contracts, resistance to authority, cruelty, ingratitude, slander, holding of slaves, polygamy, to be wrong, or immoral; and the science of E. is called upon to assign the reason, or reasons, why these various actions are so accounted.

The other question is properly psychological; in other words, relates to the constitution of the human mind. It is, by what *faculty of our nature* do we recognize this difference in actions? Is it by one of our ordinary intellectual faculties, such as reason? or by some of our emotional susceptibilities, as love and hatred? or by a mixed faculty like prudence? or by something peculiar and distinct, relating to this one object and no other, as the eye is formed for recognizing color, and the ear for sound? This question has been often improperly mixed up with the other, although there are certain theories wherein the answer to the first depends on the answer to the second.

As regards the standard of morals, it should be premised that punishment for neglect is what shows an action to be obligatory. We may dislike a man's conduct; but if we do not consider it deserving of punishment, it is not immoral in our eyes. People's imprudences, whereby they hurt themselves alone, are disapproved of; but there is seldom any disposition to step in by way of penalty in order to prevent such conduct; the disapprobation, therefore, is not of the moral kind. The punishment inflicted by society is partly legal, or through the civil government, and partly by public opinion, which, by attaching a stigma to certain conduct, is able to inspire no less dread than the civil authority. The punishment, by society acting in this way, is sometimes called the popular sanction, to distinguish it from the legal sanction. *Dishonor* is another name for the same thing. Many kinds of conduct tolerated by law, are still punished by the loss of public esteem and the infliction of disgrace. Cowardice, eccentricity, heterodoxy beyond certain limits, expose the individual to public censure. Many kinds of inhumanity, as maltreating dependents, have no other check than expressed disapprobation.

There have been various theories to account for the singling out of some actions to be authoritatively forbidden by law and society—that is, forbidden by the sanction of punishment. Some have said that the will of the Deity, or divine revelation, has indicated what we are not to do, and that there is nothing left to us but to conform to what is thus prescribed; others, as Cudworth, maintain, on the contrary, that what the Deity commands must be such as our own conscience approves, otherwise we could not give him the character of being independently good and just. It has been said that right reason shows us the difference between right and wrong; this was Cudworth's own view. Samuel Clarke conceived that there was an eternal and intrinsic *fitness* in the things considered as right, and an unfitness in the wrong, "with a regard to which the will of God always chooses, and which ought likewise to determine the wills of all subordinate rational beings." Both these writers aimed at replying to Hobbes, who had maintained that the civil magistrate is supreme in morality as well as in politics; meaning, however, in all probability, that the magistrate himself ought to frame his dictates in one, as in the other, with a view to the public good, which would be a utilitarian view. The phrase "the moral sense," which now represents perhaps the most prevalent moral theory, occurs first in lord Shaftesbury's *Inquiry Concerning Virtue*, from whom it was adopted by Hutcheson, and has since passed into general currency. Sometimes it has been maintained that a regard to self-interest is the only ultimate rule of right, which

has a very different meaning, according as we look at self exclusive, or inclusive, of other men's wellbeing. The most enlarged benevolence, in one view, is but an aspect of self. Adam Smith, in his *Theory of Moral Sentiments*, laid down as the criterion of right, the "sympathetic feelings of the impartial and well-informed spectator." But although this theory acknowledges our bias in the capacity of agents, it presumes us to be infallible when acting as judges or critics, a position by no means self-evident. The spectator has his own failings as well as the actor, unless specially qualified by nature and education to play the part of a moral judge. But to pass on. Jeremy Bentham is known as the most distinguished propounder of the principle of utility as the basis of morals, a principle explained by him as in contrast, first to asceticism, and next to "sympathy and antipathy," by which he meant to describe all those systems, such as the moral sense theory, that are grounded in internal feeling, instead of a regard to outward consequences. In opposing utility to asceticism, he intended to imply that there was no merit attaching to self-denial as such, and that the infliction of pain, or the surrender of pleasure, could only be justified by being the means of procuring a greater amount of happiness than was lost. Paley also repudiated the doctrine of a moral sense, and held that virtue is "the doing good to mankind, in obedience to the will of God, and for the sake of everlasting happiness." The utilitarian theory of Bentham, with various modifications, has been defended and expounded by James Mill, in his *Analysis of the Human Mind*, and in his anonymous *Fragment on Mackintosh;* by John Austin, in his *Province of Jurisprudence Determined;* and by Mr. John Stuart Mill in his *Dissertations and Discussions*, and in *Fraser's Magazine* (Oct. to Dec., 1861).

The great controversy may be said to lie between the adherents of the moral sense in some form or other, and those that deny both the existence of a separate faculty in the mind for perceiving moral distinctions, and the validity of the determinations of the individual conscience; maintaining that morality ought to be founded on a regard to the well-being of mankind, and that exclusively; and that rules of morality grounded on any other motives are indefensible. In short, the question is, Is morality an intuition of the mind, or is it, like the government of the state, a positive institution, on which different societies may differ, and which may be set up or abrogated at the pleasure of the society?

The theory of intuitive morality was vigorously assailed by Locke in his *Essay on the Understanding* (book i. chap. 3); and we may venture to say that his objections to what he called "innate practical principles" have never been answered. These objections have been given in a condensed form by Paley (*Moral Philosophy*, book i.). Locke urged that, in point of fact, there are no principles universally received among men; that moral rules require a reason to be given for them, which ought not to be necessary, if they are innate; that virtue is generally approved of, not because innate, but because profitable; that innumerable enormities have been practiced in various countries without even causing remorse; that the moral rules of some nations are flatly contradicted by others; that no one has ever been able to tell what the innate rules are; that we do not find children possessed of any moral rules, etc. It has been attempted to reply to the objection, founded on the great variety and opposition of moral rules in different places and times, by saying that although the substance of the moral codes differ—one part of the world being monogamous and chaste, while other nations allow promiscuous intercourse of the sexes—all agree in enjoining some moral rules; nowhere is there an absence of social and moral obligations. But this is to depart from the original question, which was to assign the standard of morals, the criterion for determining which of two opposite courses—monogamy or polygamy—is the correct or moral course. The intuitive moralists say that human nature is endowed with an instinct which at once approves the right and disapproves of the wrong, and that we need go no further than our own conscience to settle the point. Now, when the existence of contradictory consciences is pointed out, it is not to the purpose to say that these are still consciences, and indicate something as obligatory; this all admit: what we desire is to determine which we are to follow.

Dr. Whewell, in his *Elements of Morality*, has proposed a way out of this serious difficulty by setting up a supreme or standard conscience, by which the individual conscience may be squared and corrected; but he has not told us who are the men whose conscience is the standard; it being obvious that the human race, as a whole, do not recognize any such, although each separate community might consent to take some of its most estimable citizens, or the interpreters of its religious code, as models to conform to.

The following is one view of the nature and origin of our moral principles which would seem free from the grave objections above alluded to. If we set aside for the present the question as to the *proper* standard of morals, the criterion that we should consider the right criterion, if we had to enact a code of morals for the first time, and if we look at the moral principles that have prevailed in different nations and times, we shall find that they have been dictated from two distinct kinds of motives. The one is utility, in the sense of the common safety of men living in society. The prohibitions against manslaying, theft, breach of bargain, rebellion, are necessary, wherever men have formed themselves into communities; and it is the agreement in such matters as these—although subject still to very great varieties—that makes up the amount of

uniformity actually observed in the moral codes of nations. If the society did not agree to protect life and property, by punishing the murderer and the thief, nothing would be gained by coming under the sway of government, and human beings would not be got to associate themselves in tribes or nations. The common end gives a common character to the means, without supposing a special instinct to suggest that stealing is wrong. But, in the second place, there have been, in the moral codes of all countries, prohibitions not connected with any public utility, but prompted by strong sentimental likings or aversions, which have acquired the force of law, and are made the foundation of compulsory enactments. Of this kind is the antipathy of the Jew and the Mohammedan to the pig, the Hindoo repugnance to animal food generally, and the usages of a merely ceremonial kind prevailing among many nations, which are as stringently enforced by law and public opinion as the sacredness of life and property. For a woman, among the Mussulmans, to expose her face in public, is as great an offense as going naked would be with us; while, among savage tribes, in warm climates, where clothing is little required, it is no shame to expose the whole person. For these practices, no reason can be given; the public sentiment has determined some things to be right and others wrong, without reference to any public or private utility; and it is in these enactments, founded on liking or disliking, that nations have differed most widely, the difference often amounting to contrariety. The ancient Greeks held it as a sacred obligation to drink wine in honor of Dionysus (Bacchus); the Nazarenes among the Jews and the Mohammedans entertained an opposite view. A legislator for the North American Indians might prohibit alcoholic liquors on the ground of public utility, the natives not being able to control themselves under stimulants; but the prohibition of wine in those other instances is probably a species of asceticism, or an aversion to human pleasures as such, which belongs to the domain of sentiment, and not to the consideration of utility.

Looking at the many capricious injunctions that owe their origin to fancies such as these, it may be doubted whether the human race can ever gain anything by departing from the principle of utility as the sole criterion of good morality; and there is an increasing tendency to recognize the supremacy of this principle both in morals and in legislation. Justice, truth, purity, although sometimes viewed sentimentally, or as being ends themselves, are in men's practice looked upon more and more as of the nature of *means*, the promotion of human happiness being the end.

A great number of the existing moral rules can be traced to a distinct historical origin, proving still more decisively that they are not the suggestions of a universal instinct of the human mind. The Mohammedan code of morals came from Mohammed; Confucius was the moral legislator of one large section of the Chinese. The making of the marriage tie irrevocable in Christendom was an exercise of papal authority in the 13th c., and has since been repealed in some Protestant countries, although retained in Catholic states. See DIVORCE, MARRIAGE. The sentiment which forbids the holding of human beings as slaves is chiefly the growth of the last two or three centuries.

Although the doctrine of intuitive morality is, in this view, denied, it is still admitted that there is such a power in the mind as conscience, which warns us when we are doing wrong, and is to a certain extent a force to make us do right. But it cannot be shown that we are born with any such principle, combining both enlightenment and motive power. Conscience is a *growth*. There are in our constitution certain primitive impulses that so far coincide with what is our duty, and therefore contribute to the formation of the conscience; these are principally self-preservation, or a regard to ourselves, and sympathy, or a regard to others. There are many duties that we are prompted to for our own interest, such as telling the truth, in order that people may confide in us; obeying the laws, to avoid punishment, etc. But we cannot perform all our social duties if we look merely to ourselves. We must, in addition to prudence, have a source of *disinterested* action, inducing us both to avoid injuring our fellow-beings in the promotion of our own selfishness, and occasionally to sacrifice ourselves for the sake of others. Such a principle exists in our mental nature, although not of equal strength in all minds. Being provided with these two primitive springs of action, we are susceptible of being educated to the sense of moral obligation. The child is first taught obedience by penalties, and is made to associate pain with forbidden actions. This is the germ of conscience. Habits of avoiding what is prohibited under penalties are gradually formed, and the sense of authority and law is thereby acquired. When the powers of observation and reason come to maturity, the individual sees why the restrictions of duty have been imposed, and is then ready of his own accord, and apart from the fear of punishment, to behave rightly. The conscience, grounded on fear, then becomes the conscience grounded on spontaneous approval.

Conscience thus follows, and does not precede, the experience of human authority. Authority, sanctioned by punishment, is the type and the starting-point, even when the conscience takes an independent flight, and adopts rules for itself different from those that entered into its education. The great mass of human beings have nothing more than the slavish conscience, or the habits imparted by the exercise of the parental and public authority, which shows what is the most natural foundation of moral sentiment. The persons that judge of right for themselves, instead of implicitly receiving the maxims peculiar to the society where they grow up, are so few as to be

the exception everywhere; their conscience does not prove what is the usual endowment of human nature in this respect.

Inquiries of the nature of those above sketched, proceed upon the assumption that moral distinctions have their ground in the constitution of the world and of man's nature, and may be discovered by the exercise of human reason, as the other laws of the universe are. But practically, the rules of morality have, in almost all communities, been more or less dependent upon a belief in divine laws supernaturally revealed. The relation of these to scientific ethics will be considered under REVELATION.

ETHIO'PIA, the Biblical *Kush*. Originally, all the nations inhabiting the southern part of the globe, as known to the ancients; or rather, all men of dark-brown or black color, were called Ethiopians (Gr. *aithō—ōps*, sunburned). Later, this name was given more particularly to the inhabitants of the countries s. of Libya and Egypt, or the upper Nile, extending from 10° to 25° n. lat., 45° to 58° e. long.—the present Nubia, Sennaar, Kordofan, Abyssinia. The accounts which the ancients have left us with respect to this people are, even where they are not of an entirely fabulous nature, extremely scanty and untrustworthy, as both Greeks and Romans never got beyond Napata, 19° n. lat. We will just mention that from the Homeric age down to Ptolemy—who is somewhat better informed—these regions were peopled by Pygmies, Troglodytes (dwellers in caverns), Blemmyes (hideous men), Macrobii (long-lived men), etc., besides being divided into the land of cinnamon, myrrh, of elephant-eaters, fish-eaters, tortoise-eaters, serpent-eaters, etc. The only portion of ancient records which does contain something akin to historical accounts, is that which refers to Meroë, an island formed by the rivers Astaphus and Astaboras, tributaries of the Nile. There stood, from times immemorial, an oracle of Jupiter Ammon. This, and the central portion of the island, together with the extraordinary fertility of its soil, the abundance of animals, metals, etc., made it not only the chief place of resort for all the inhabitants of the adjacent parts, especially the numerous nomad tribes, but also the emporium for India, Arabia, Ethiopia, Egypt, Libya, and Carthage. Thus it grew so rapidly, that about 1000 B C. it counted among the most powerful states of the ancient world; and about 760, having ever since Sesostris been tributary to Egypt, it succeeded, under Sabacus, in shaking off the Egyptian yoke, and continued, in its turn, to hold Egypt for about sixty years. During the reign of Psammetichus, 240,000 Egyptians settled in Meroë, which, the greater part of the immigrants being artisans, traders, etc., rose still higher. Many new cities were built, and the state was in the most flourishing condition, when it was conquered by Cambyses, about 530 B.C. He fortified the capital town, and called it Meroë. After the destruction of Thebes by Cambyses, most of the inhabitants of that city took refuge there, and made the country still more Egyptian. Ergamanes transformed its theocracy into a military monarchy, in the 3d century. Under Augustus, Meroë was conquered, and a queen Candace is mentioned as his vassal. Under Nero, nothing but ruins marked the place of this once powerful and highly civilized state. Up to this day, remnants of mighty buildings, covered with sculptures—representations of priestly ceremonies, battles, etc.—and half-defaced inscriptions hewn in rocks, besides rows of broken sphixnes and colossi, are frequently met with in those parts.

Their religion, art, form of government, and civilization, generally being—in their chief features at least—so identical with the Egyptian as to have given rise to the question, which of the two nations imparted their knowledge to the other, we will refer the reader for these points to the article EGYPT; and will proceed now to say a few words on the history of the descendants of the ancient Ethiopians—the inhabitants of the present Habesch, or Abyssinia—as we derive it from their poor and scanty native chronicles.

According to these, the son of Solomon and the queen of Sheba (Makeda as they, Balkis as the Arabian historians call her), named Menilehek, was the first king of the Ethiopians. Few kings' names occur up to the time of Christ, when Bazen occupied the throne. The missionary Frumentius (330) found two brothers (Christians) reigning—Abreha and Azbeha. During the time of the Greek emperor Justin (522), king Elezbaas destroyed the state of the Homerites in Asia, in order to revenge their persecutions of Christians; and was canonized. From 960 to 1300, another dynasty, the Zagoean, held the chief power, all the members of the Solomonic dynasty, save one, having been mudered by Esal, who made her son king. In 1300, Ikon-Amlak, a descendant of this one scion of the house of David, who had fled to Sheba, regained possession of the country, and made Sheba, instead of Axum, the seat of government. To this day, his family rules the country. Frequent revolutions within, more especially brought about by the religious squabbles imported by the Portuguese towards the end of the 15th c., and a host of enemies all around—the most formidable of whom were wild nomad tribes of the desert—forced the kings more than once to apply for foreign help; amongst others, that of the Turks in 1508; and the affairs of the modern state have at all times been anything but prosperous. Special mention is made of king Zara-Jakob (Constantine), 1434–68, who sent an embassy to the church-council at Florence; of Aznaf-Saged (Cladius), 1540–59, during whose reign Christoph. de Gama from Portugal lived in E., and made common cause with him against his enemies. This king also wrote a confession of faith, in which he defended his church both against Jesuits and the charge

of leaning towards Judaism. Socinios (1605–32) openly professed Roman views; but his son Facilides soon expelled the Jesuits and their friends from the country, and put an end to the Roman influence. Among these friends was also Abba Gregorius, later the friend of the great Ethiopologist Ludolf, who, having made his acquaintance at Rome, induced him to migrate to Gotha; where he also remained until his death. Under Joas (1753–69), the Gallas, a nomad tribe, hitherto the mightiest and most dangerous enemies of the Ethiopians, not only gained admission to all the offices in the state, but acquired almost absolute power. One of them (Susul Michael), holding the place of râsh, or prime minister and chief commander of the troops, proved a very great friend to Bruce, to whom he also intrusted the government of a province. The several provinces remained practically independent, each chief striving to subdue his neighbors, till in 1855, the chieftain afterwards known as Theodore (q.v.) attained supremacy. See also art. Abyssinia. The king resided but rarely in the city, and for the most part remained with his soldiers in the camp. His official name was Negus, or in full, Negus Nagass Za-itjopja, king of the kings of Ethiopia—alluding to the chiefs of the towns and provinces. The soldiers receive no pay, but rely on plunder; and have proved themselves able to fight bravely.

Emigrants, as were beyond doubt the earliest settlers in E., from the other side of the Arabian isthmus, it is but natural that the structure of their language, as well as that of their own bodies, should bear traces of their Shemitic origin. The reason of this emigration is contained in the very name of this language, which is called *Geez*—free, affording a most striking parallel to the designation *Franc*—French. Free places of habitation were what they came in search of. The name Ethiopian, or, as they call it, Ithiopjawan, they adopted from the Greeks at a very late period. This their oldest language, *Leshana Geez*, was suppressed by a royal decree of Ikon-Amlak, in the 14th c., and the Amharic adopted as the court language. Ever since, it has, with exception of the province of Tigré, where it is still spoken (with slight idiomatic changes), remained the *Leshana Mazhaf*, the language of books and of the church. It is exclusively used in writing, even of ordinary letters, and the educated alone understand it. Its general structure comes as close to that of the Arabic as a dialect can and must. A great many of its words are still classical Arabic; others resemble more the Hebrew and its two Chaldee dialects, the Aramaic and Syriac; others, again, belong to African dialects; and many, as the names of the months, are Greek. It has 26 letters, 22 of which bear the ancient Shemitic stamp, and exhibit the greatest likeness to the Phenician, the common original alphabet; and seven vowels, including a very short *e*, which sounds precisely like the Hebrew Schĕwa. These vowels are represented by little hooks, and remain inseparably attached to their respective letters; and as the Geez, unlike all its sister-languages, is never written without vowels, the alphabet becomes a syllabary with 182 characters. Another difference exists in its being written from left to right—a circumstance from which some have concluded that the Greeks introduced writing in E.; forgetting, in the first place, that Greek itself was frequently written from right to left, and that Zend, certain cuneiferms, hieroglyphs, etc., are likewise written from left to right. We cannot enter here into the grammatical minutiæ of the language; we will only mention that out of the ten conjugations, eight are Arabic; that there is a double infinitive, but no participle and no dual; that the formation of the so-called plural, and of declension generally, point to that very remote period when the Hebrew and Arabic made use of the same grammatical processes. There are no diacritical marks employed in writing; the letters are not combined, and the words are separated by two dots.

Although there can be no doubt of the existence of a rich literature in a flourishing country like E. anterior to Christ, still, owing both to frequent internal convulsions, and the misguided zeal of the early Christian missionaries, who here and elsewhere considered it their first duty to destroy all the ancient records of which they could get hold, nothing but a few half-erased inscriptions have survived. The earliest existing document of post-Christian literature is a complete translation of the Bible, probably by Frumentius. See Frumentius. The Old Testament, probably a translation from the Alexandrine version of the LXX., consists of four parts: 1, the Law or Octateuchos (five books of Moses, Joshua, Judges, Ruth); 2, Kings; 3, Solomon; 4, Prophets, and two books of the Maccabees. The New Testament consists of—1, Gospels; 2, Acts; 3, Paulus; 4, Apostolus. A very peculiar book, Henoch, belongs also to the literature of the Old Testament. See Enoch. The New Testament comprises likewise another book, Senodas, containing the pseudo-Clementine or apostolical constitutions. The Ethiopians have a liturgy (*Kanon Kedaso*—Holy Kanon) and a symbolico-dogmatical work (*Haimanota Abau*—Belief of the Fathers), containing portions of homilies of the Greek fathers, Athanasius, Basil the great, Chrysostom, Cyril, Gregory of Nyssa and Nazianzen. Besides these, they have martyrologies, called Synaxar. They employ in this their sacred literature a peculiar kind of rhythm without a distinct meter. Any number of rhyming lines forms a stanza, without reference to the number of words constituting the verse, or of verses constituting the stanza. They also use certain phrases as a refrain—not unlike the manner of the mediæval Hebrew Pizmon. See Jewish Liturgy. As to general literature, they have neither a written book of laws, nor a grammar of their own language, nor, in fact, anything worth mentioning, except a *Chronicle of Axum* and *Chronicles of Abyssinia*. They are very fond, however, of riddles, wise saws, and

the like, so fascinating to the eastern mind. They have a dictionary, but most of its explanations and translations are utterly wrong. No wonder the learned in Europe should have been sorely puzzled by such a language, and that they should, after long consideration, have pronounced it to be either "Chaldee" or "Indian," while Bruce held it to be the language of Adam and Eve. Potgen, a Cologne church-provost, happening to be at Rome at the beginning of the 16th c., there made the acquaintance of native Ethiopians, and became the first to enlighten the world on the nature of this occult language. After him came the Carmelite Jacob Marianus Victorius, from Reate, who wrote *Institutiones Linguæ Chaldææ S. Æthiop.* (Rome, 1548), an entirely worthless book; then Wemmers, who in 1683 published an Ethiopian grammar and dictionary. The principal investigator, however, is Hiob Ludolf from Gotha, who, aided by the Abba Gregorius, before mentioned, and supported by his own extraordinary linguistic talents and indomitable energy, acquired such a power over this language, that notwithstanding the number of eminent Orientalists, such as Platt, Lawrence, Dorn, Hupfeld, Hoffmann, Roediger, Ewald, Isenberg, Blumenbach, etc., who have since worked in this field, his books, as re-edited by Dillmann, still hold the first place. It is hardly necessary to add, that the Ethiopian is one of the most important and indispensable languages to the Shemitic scholar, containing as it does a great many words and forms of a date anterior to the separation of the different Shemitic dialects. Among the most important Ethiopian books printed in Europe are the Psalms, edited with a Latin translation by Ludolf (Frankfort, 1701); the New Testament, in two volumes (Rome, 1548); the book of *Henoch* (Lond. 1840); *Ascensio Isaiæ Vatis*, with a Latin translation by Lawrence (Oxford, 1819); *Didascalia*, or apostolical constitution of the Abyssinian church (Lond. 1834).—Ludolf's works are *Grammatica Æthiopica* (Lond. 1661; new ed. by Dillmann, 1857); *Lexicon Æthiopicum* (Frankfort, 1699); new ed., 1862); *Historia Æthiopica* (1681). Since the English expedition to Abyssinia, the British museum possesses a larger number of Ethiopic MSS. than any other library.

ETHIOPS, or **ÆTHIOPS** (Gr. *aithō*, I burn, and *ops*, countenance; being of a black or burned countenance), is a term applied by the ancient chemists to certain oxides and sulphides of the metals which possessed a dull, dingy, or black appearance. Thus, *ethiops martialis* was the mixture of protoxide and peroxide of iron, known as the black oxide; *ethiops mineral*, or *ethiops narcoticus*, the black-gray sulphuret of mercury procured by triturating in a mortar a mixture of mercury and sulphur; and *ethiops per se*, was obtained by agitating commercial mercury for weeks or months, when the oxygen of the air slowly formed the black oxide of mercury.

ETHMOID BONE, THE (so called from *ēthmos*, a sieve), is one of the eight bones which collectively form the cavity of the cranium. It is of a somewhat cubical form, and is situated between the two orbits of the eye, at the root of the nose. Its upper surface is perforated by a number of small openings (whence its name), through which the filaments of the olfactory nerve pass downwards from the interior of the skull to the seat of the sense of smell, in the upper part of the nose. It consists of a perpendicular central plate or lamella, which articulates with the vomer and with the central fibro-cartilage, and thus assists in forming the septum or partition between the two nostrils. The lateral masses present a very complicated arrangement, and are so planned as to give in a small space a very large amount of surface, on which the filaments of the olfactory nerve are spread. In comparative anatomy, we find a direct ratio between the development of these masses and the acuteness of the sense of smell. See NOSE AND THE SENSE OF SMELL.

ETHNOGRAPHY, a term closely allied to ethnology (q.v.). Ethnography embraces the details, and ethnology the rational exposition, of the human aggregates and organizations known as hordes, clans, tribes, and nations, especially in the earlier, the savage, and barbarous stages of their progress. Both belong to the general science of anthropology (q.v.), or the natural history of mankind, being related to it as parts to a whole. Ethnography and ethnology, indeed, run up into anthropology as anthropology does into zoölogy, and zoölogy into biology. No very sharp line can be drawn between these two sciences themselves, their differences being mainly those between the particular and the general, between the orderly collection of local facts, and the principles according to which they may be grouped and interpreted. Ethnographists deal with particular tribes, and with particular institutions and particular customs prevailing among the several peoples of the world, and especially among so-called savages. Ethnologists bring simultaneously under review superstitions, legends, customs, and institutions which, though scattered in distant regions of the earth, have some common basis or significance. Ethnography and ethnology run as easily one into another as the two sections of general anthropology, viz.: 1, anthropology proper, as expounded by anatomists and physiologists, who deal with the different races of men, their elements, modifications, and possible origin; and, 2, demography, which, as constituted by the researches of Quetelet and his friends and disciples, as Farr, Galton, Guillard, and Bertillon, treats of the statistics of health and disease, of the physical, intellectual, physiological, and economical aspects of births, marriages, and mortality. Ethnography, ethnology, and anthropology are interwoven with philology, jurisprudence, archæology, geography, and the various branches of history. A fact may require to be investigated successively by linguists,

anatomists, and mathematicians. In current language, ethnography and ethnology are often used indiscriminately; but if a distinction be made between them, an instinctive perception teaches us to speak of ethnographic facts and ethnological theories, of ethnographic literature and ethnological science—ethnology being related to ethnography as the wine to the grape.

ETHNOLOGY (Gr. *ethnos*, nation or race, and *logos*, discourse), a term applied to the science that treats of the persistent modifications of the human family or group; their most marked physical, mental, and moral characteristics when compared one with the other; their present geographical distribution on the globe; their history traced backwards to the earliest attainable point; and, finally, the languages of the various nations and tribes of mankind, existing or extinct, classified and compared, with the view, by their means, of determining the chief points of resemblance or dissimilarity among the nations of the earth. This science has gradually outgrown its name. It has been therefore deemed expedient to apply to it a term of wider and more neutral significance—namely, anthropology—derived from the Greek *anthropos*, man, and *logos*, a discourse. The term *ethnology* has this inconvenience, that it means no more than the "science of races," and many authorities not only deny the existence of *races* of mankind, affirming that what are called races are in reality distinct species, but others argue that the term is as applicable to any races—e.g., races of dogs, or cats, or pigeons—as to the races of mankind. Hence the more exact and less sectarian term anthropology has been applied to denote the science that treats of the natural history of man. The science is divided into three branches—1. *Zoölogical anthropology*, which treats of the relations of man to the brute creation; 2. *Descriptive anthropology*, or ethnography, which classifies and describes the various divisions and subdivisions of mankind, and marks out their geographical distribution; 3. *General anthropology*, which M. Broca calls "the biology of the human race," which, says a recent writer on the subject, "borrows and collates from all sciences facts and phenomena usually investigated in men as individuals, but which relate to men as groups of individuals," and compares these with other facts relating to other groups of individuals. The study and bare description of a single negro's skull is mere human anatomy; the study of a group of negroes' skulls, and the description and comparison of their peculiarities with those of groups of skulls belonging to other races, would be a specimen of the work done by general anthropology.

No one can look at an Englishman, a red Indian, and a negro, without at once noticing the differences between the three, not only as regards the color of their skin, but the shape of the skull, the texture of the hair, and the character of the several features, as eyes, lips, nose, and cheek-bones. What strikes the ordinary observer chiefly is, of course, the difference of complexion; but the anatomist is fully as much interested in the shape of the skull. The first thoroughly scientific writer who endeavored to lay down a method of distinguishing between the different races of mankind by a comparison of the shape and size of the skull was Peter Camper, a distinguished Dutch anatomist of last century. He laid down a technical rule for ascertaining the *facial line*, and determining the amount of the *facial angle*, which he has thus described: "The basis on which the distinction of nations is founded may be displayed by two straight lines, one of which is to be drawn through the *meatus auditorius* to the base of the nose, and the other touching the prominent center of the forehead, and falling thence on the most advancing part of the upper jaw-bone, the head being viewed in profile. In the angle produced by these two lines may be said to consist not only the distinctions between the skulls of the several species of animals, but also those which are found to exist between different nations." The heads of birds display the smallest angle, and it apparently becomes of greater extent "in proportion as the animal approaches more nearly to the human figure. Thus, there is one species of the ape-tribe in which the head has a facial angle of 42 deg.; in another animal of the same family, which is one of those simiæ most approximating in figure to mankind, the facial angle contains exactly 50 deg. Next to this is the head of the African negro, which, as well as that of the Kalmuck, forms an angle of 70 deg.; while the angle discovered in the heads of Europeans contains 80 deg. On this difference of 10 deg. in the facial angle, the superior beauty of the European depends; while that high character of sublime beauty which is so striking in some works of ancient statuary, as in the head of Apollo, and in the Medusa of Sisocles, is given by an angle which amounts to 100 deg." The nearer the facial angle approached a right angle, the greater was held to be the intellectual development of the race. But M. Jacquart, of the natural history museum in Paris, showed that the facial angle in stupid people very often approached closely a right angle, and that, in the homogeneous population of Paris, the facial angle varied within wider limits than those Camper stated as a criterion of distinct species.

Camper's method was abandoned for the vertical method, or *norma verticalis*, invented by Blumenbach. The object being to collect the greatest number of characteristics—"The best way," says Blumenbach, "of obtaining this end is to place a series of skulls with the cheek-bones on the same horizontal line resting on the lower jaws; and then viewing them from behind, and fixing the eye on the vertex of each, to mark all the varieties in the shape of parts that contribute most to the national character,

whether they consist in the direction of the maxillary and malar bones, in the breadth or narrowness of the oval figure presented by the vertex, or in the flattened or vaulted form of the frontal bone." Founding upon this mode of admeasurement applied to a large collection of skulls of different nations, accumulated by himself, Blumenbach classified the human family into the following five varieties—viz., the Caucasian, Mongolian, Ethiopian, Malay, and American. In the first of these—which he made to include the Caucasians or Circassians proper, the Celts, the Teutons, the Shemites, the Libyan family, the Nilotic family, and the Hindustanic family—the skull is large and oval, the forehead expanded, the nasal bones arched, the chin full, and the teeth vertical. In the second—which embraces the Chinese and Indo-Chinese, the natives of the polar regions, the Mongol Tartars, and the Turks—the skull is oblong, but flattened at the sides, the forehead low and receding, the nose broad and short, and the cheek-bones broad and flat, with salient zygomatic arches. In the third—embracing the Negroes, Kafirs, Hottentots, Australians, Alforians and Oceanic Negroes—the skull is long and narrow, the forehead low, the nose broad and flat, the cheek-bones prominent, the jaws projecting like a muzzle, the lips thick, and the chin small. In the fourth—embracing the Malays and Polynesians generally—the skull is high and square, the forehead low, the nose short and broad, and the jaws projecting. In the fifth—embracing the American family and the Toltican family—the skull is small, with the apex high, and the back part flat, the forehead receding, the cheek-bones high, the nose aquiline, the mouth large, and the lips tumid.

This classification of the human family, with the added characteristics, under each class, of complexion, hair, and eyes, is, upon the whole, the most popular, Blumenbach having taken considerable pains to elaborate it, and present it to the world in a form acceptable to scientific inquirers. Later researches, however, have proved it to be not quite tenable. Thus, Cuvier reduced the five classes of Blumenbach to three—viz., the Caucasian, Mongolian, and Ethiopian, treating the Malay and American as subdivisions of the Mongolian. Jacquinot does the same. Dr. Prichard, who brought to the study of E. not only a large acquaintance with physiology, but a considerable knowledge of languages, admits a greater number of varieties than Blumenbach, but divides his Caucasian class into two independent groups, which he calls the Syro-Arabian or Semitic, and the Aryan or Indo-Germanic. Moreover, he objects to the term Caucasian, as representing the notion that mankind had their origin on mountain heights. For himself, Prichard holds with the view that it was rather on the banks of large rivers and their estuaries that the primitive nations developed themselves. "The cradles or nurseries of the first nations, of those at least who became populous, and have left a name celebrated in later times, appear to have been extensive plains or valleys, traversed by navigable channels, and irrigated by perennial and fertilizing streams. Three such regions were the scenes of the earliest civilization of the human race, of the first foundation of cities, of the earliest political institutions, and of the invention of the arts which embellish human life. In one of these, the Semitic or Syro-Arabian nations exchanged the simple habits of wandering shepherds for the splendor and luxury of Nineveh and Babylon. In a second, the Indo-European or Japetic people brought to perfection the most elaborate of human dialects, destined to become in after-times, and under different modifications, the mother-tongue of the nations of Europe. In a third, the land of Ham, watered by the Nile, were invented hieroglyphical literature, and the arts in which Egypt far surpassed all the rest of the world in the earlier ages of history." Dr. Prichard, in his well-known *Natural History of Man*, commences with a description of these three divisions of the human race, not as discriminated one from the other by the form of the skull, but as comprising nearly all the civilized communities, and indeed most of the tribes of people known to antiquity. "They were neither nomades nor savages, nor do they display in their crania either of the forms principally belonging to races in those different states of existence. They had all heads of an oval or elliptico-spherical form, which are observed to prevail chiefly among nations who have their faculties developed by civilization." As they cannot, however, by any means be made to comprehend all the types of man, after the Egyptians, he describes the great body of the nations of Africa, embracing tribes sunk in the lowest state of degradation; and after the Ayrans, or Indo-Europeans, the people of high Asia, chiefly nomades, inhabiting vast steppes, and never rising in the scale of civilization beyond the condition of wandering shepherds, though in this capacity possessing some wealth, and acquainted with the use of clothing, tents, and wagons. "These classes of nations," he observes, "have different physical characters. Among the African savages we find the *prognathous* form of the head and all its accompaniments; and these traits display themselves in proportion to the moral and physical degradation of the race. In Northern Asia, most of the inhabitants have the pyramidal and broad-faced skulls." Referring our readers to the articles ARYAN RACE, EGYPT, and SHEMITIC NATIONS respectively, for more detailed information on the subject of these three grand divisions of mankind, we shall here only notice Dr. Prichard's subdivisions of one of them, namely, the Aryan race.

The great Aryan or Indo-European race, which extends itself from the mouth of the Ganges to the British islands and the northern extremities of Scandinavia, divides itself, according to Prichard, into two branches—viz., the parent stock in Asia, and the colonies that it successively sent forth into Europe. The Asian branch comprises: 1. Hin-

dus; 2. Persians; 3. Afghans; 4. Baluchi and Brahui; 5. Kurds; 6. Armenians; and 7 Ossetines. The collective body of the European nations are now generally regarded as a series of colonies from Asia. The proof turns mainly on a comparison of languages; the ancient Sanscrit being regarded by the most competent judges as the parent not only of the Greek and Latin languages, but of the Teutonic, with its several ramifications of the Slavonic, Lettish, Lithuanian, and even Celtic. Dr. Prichard himself was the first to point out the affinity of the Celtic with the Sanscrit, Greek, Latin, and Teutonic, in a memoir published by him in 1831, on the *Eastern Origin of the Celtic Nations*. Later philologers have confirmed the view taken by him, and he is perhaps correct also in the conclusion, that they were the first great immigration of the Aryans into Europe, who were afterwards conquered, and their numbers considerably reduced by fresh advancing colonies from the same parent hive. But there are other nations or tribes of Europe which no efforts of the philologists have succeeded in tracing to the Aryan stock; such are the Lapps, Finns, Tschudes, and Ugrians of the n., and the Euskaldunes, now principally represented by the Basques in the west. To these, Dr. Prichard has given the appellation of Allophylian (Gr. *allos*, another, and *phule*, tribe), thereby signifying their independence of the Aryan stock. The progenitors of these tribes were probably the inhabitants of Europe, prior to the first Aryan immigration.

After these several races, Dr. Prichard treats of the native tribes of the austral seas and the great Southern ocean, and finally, of the native inhabitants of America. In every case, he carefully describes the physical appearance or structure, the geographical *habitat*, history, and migrations (if any), the language, and the moral and psychical attributes of the nation or tribe immediately brought under notice. His information has generally been obtained from the best sources, and hence his works may be regarded as a storehouse of knowledge upon the subject of ethnology.

But both before and since Blumenbach and Prichard, there have been several classifications of the human race proposed, the simplest of which is perhaps that of Dr. Latham, into 1. Mongolidæ; 2. Atlantidæ; 3. Japetidæ. This writer is properly regarded as the chief living exponent of the science of E. in this country. Following in the track of Prichard, and possessing, like him, a considerable acquaintance with physiology and history, he distances him altogether in the department of comparative philology. His contributions to the science of E., borrowed from this particular branch of study, are consequently of the highest value. But there is one important question, with respect to which the suffrages of the best philologers are rather with Prichard than with Latham —viz., the origin of the Aryan or Indo-European race. Prichard, as we have seen, refers it to Asia, while Latham claims it for Europe.

Retzius's classification is based on the idea that the psychical individuality of a race is expressed by brain-development as indicated by the shape of the skull. He divides races into—I. Dolichocephalic, or long-skulled races, where the length of the skull is due to a lengthening of the posterior lobes of the brain, and II. Brachycephalic, or short, broad-skulled races, in whom the comparative shortness of these lobes causes them to be more developed in breadth. These are subdivided, according to the form of the face, into (1) orthognathous, or straight-faced peoples; e.g., Europeans; and (2) prognathous, or races with projecting jaws, e.g., Negroes. This classification laid the foundation of ethnographic craniology. Zeune divides mankind into—(1) races with high skulls, e.g., Indo-Europeans; (2) races with broad skulls, e.g., Mongols and some Malay tribes; (3) races with long skulls, e.g., Negroes. Such classifications err in grouping under the same divisions races between which it is otherwise impossible to establish any consanguinity. Passing over the wild speculative classifications of the modern German materialistic school, a specimen of which is that of Carl Vogt, who, assuming the ape origin of mankind to be an indubitable fact, describes three great divisions of the human race in correspondence with the three species of anthropomorphic apes found in Asia, Africa, and America, the only other very recent classification with pretensions to scientific reasonableness, is that of prof. Huxley, which is founded on the hair as a race-character. He describes two primary divisions—I. Ulotrichi, crisp or woolly-haired people, with skulls longer than they are broad (dolichocephalic), and with the skin-color varying from yellow to black. Negroes, Bushmen, and Malays are subdivisions of this great group. II. Leiotrichi, or smooth-haired people, subdivided into (1) the Australoid group, with "dark eyes, wavy black hair, and eminently long, prognathous skulls, with well-developed brow ridges;" (2) the Mongoloid group, e.g., Chinese, Tartars, Polynesians, and American aborigines; (3) The Xanthocroic group, fair, blue-eyed people, e.g., Sclavs, Teutons, Scandinavians, and fair, Celtic speaking nations; (4) The Melanocroic group, or pale-skinned people, with dark hair and eyes, e.g. the Iberians, or "black Celts" of Europe, the inhabitants of the Mediterranean coast and of western Asia—a group resulting probably from intermixture of the Australoid and Xanthocroic races. Under the Australoid group is classed such apparently unrelated races as the Australians, the Dekhan tribes in India, and the ancient Egyptians; and curiously enough, col. Lane Fox has since shown that, from resemblances in the weapons, implements, etc., in use amongst these very races, prof. Huxley's apparently startling views as to their affinity are not at all improbable.

A more important question is, what do classifications classify—species or varieties? Prichard held that mankind sprung from one stock, and constituted one species. Exi-t

ing diversities in form and physique in races he accounted for by the influence of food, climate, and other circumstances operating through a long series of years. Mr. Darwin's recent work on *Animals and Plants under Domestication* powerfully corroborates this view, for it demonstrates that within the limits of one admitted species of animal there may be produced, by the operation merely of artificial selection and hereditary transmission of peculiarities, diversities infinitely greater than those existing between the highest and lowest races of mankind. Then, again, the highest and lowest human races interbreed, and their offspring is fertile, which would hardly be the case if the parents were of different species. Some have held that the difficulties of migration from an original center of creation were too great to be compatible with the wide geographical distribution of mankind. Yet even the South Sea islanders—and in their case the difficulties alluded to must have been greater than in most others—may have come to their present abodes by migration; for Japanese mariners have sometimes by stress of weather been driven from their course, and cast on the shores of islands in the South Seas. This doctrine of monogeny, or original unity of the human race, is supported by Dr. Latham with arguments drawn from philology. Dr. Latham, taking it as a matter of fact that all the languages of mankind have had a common origin, argues from it in favor of an original unity of race. This common origin of languages, however, is a thing by no means proved. "The idea of an original language of the whole human race," says Dr. Waitz (*Introduct. Anthropologie Naturvölker*), "is by science now regarded as a chimera." Admitting that Klaproth, Fürst, and Delitzsch have taken great pains to establish an affinity between the Sanscrit and the Hebrew, M. Renan and other excellent authorities regard the attempt as unsuccessful, and, even were it otherwise, "the Chinese," says a late writer (Farrar, *Essay on the Origin of Language*), "must always remain a stumbling-block in the way of all theories respecting a primitive language. Radical as is the dissimilarity between Aryan and Semitic languages, and wide as is the abyss between their grammatical systems, yet they almost appear like sisters when compared with the Chinese, which has nothing like the organic principle of grammar at all. Indeed, so wide is the difference between Chinese and Sanscrit, that the richness of human intelligence in the formation of language receives no more striking illustration than the fact, that these languages have absolutely *nothing* in common except the end at which they aim. This end is in both cases the expression of thought, and it is attained as well in Chinese as in the grammatical languages, although the means are wholly different."

Having thus made the reader in some degree acquainted with the views of Drs. Prichard and Latham on the subject of E., we now proceed to inform him of the totally different views and conclusions of the American school of ethnology. This school was founded by the late Dr. Morton of Philadelphia, an erudite and active man of science, who labored for many years in forming a collection of human crania of all nations, and of ancient as well as modern ages, with the design of still further carrying out Blumenbach's researches into the varieties of mankind by a comparison of crania, according to the method he had proposed. This collection of crania was begun in 1830, and at the time of Morton's death in 1851, amounted to the large number of 918 human crania, to which were afterwards added 51; and it, besides, included 278 crania of mammals, 271 of birds, and 88 of reptiles—in all 1606 skulls, being the largest collection of the kind ever formed, and which, fortunately for the purposes of science, is now deposited in the museum of the academy of natural sciences at Philadelphia. Simultaneously with this accumulation of crania, Dr. Morton carried on his researches in E., not, however, in the restricted sense in which he began, following Blumenbach's classification, but availing himself of the latest discoveries of Prichard, and the other English and continental writers. One of the results of his labors was the publication, in 1839, of a handsome work, entitled *Crania Americana*, which was followed in 1844 by the *Crania Ægyptiaca*, in the collection of which he had been much aided by Mr. G. R. Gliddon. "In this work," says his biographer, Dr. Patterson, "Morton found himself compelled to differ in opinion from the majority of scholars, in regard to certain points of primary importance." The great question of the unity or diversity of mankind in their origin was one that early forced itself upon his attention, and the conclusion at which he arrived, after much patient investigation, was in favor of the latter view. He was slow to publish any opinion on the subject, probably reserving it for a work upon which he was engaged, to be entitled the *Elements of Ethnology*. His opinion, however, was well known to his friends. In a note to a paper in *Silliman's Journal* for 1847, he says: "I may here observe that whenever I have ventured an opinion on this question, it has been in favor of the doctrine of primeval diversities among men; an original adaptation of the several races to those varied circumstances of climate and locality which, while congenial to the one, are destructive to the other; and subsequent investigations have confirmed me in these views." In a latter to Dr. Nott, dated Jan., 1850, he lays down the following proposition: "That our species had its origin, not in one, but in several or in many creations, and that these diverging from their primitive centers, met and amalgamated in the progress of time, and have thus given rise to those intermediate links of organization which now connect the extremes together. Here is the truth divested of mystery; a system that explains the otherwise unintelligible phenomena so remarkably stamped on the races of men." His latest utterance upon the subject is contained in a letter written to Mr. G. R. Gliddon, in April, 1851, only a fortnight before the writer's

decease, which concludes as follows: "The doctrine of the original diversity of mankind unfolds itself to me more and more with the distinctness of revelation." His views upon this and other points of dispute among ethnologists have been since embodied in a remarkable work, entitled *Types of Mankind; or, Ethnological Researches based upon the Ancient Monuments, Paintings, Sculptures, and Crania of Races, and upon their Natural, Geographical, Philological, and Biblical History: illustrated by selections from the inedited papers of S. G. Morton, M.D., and by additional contributions from Prof. L. Agassiz, W. Usher, M.D., and Prof. H. S. Patterson.* By J. C. Nott, M.D., and G. R. Gliddon (Philadelphia, 1854). In this composite work, perhaps the most remarkable feature is the paper contributed by the celebrated naturalist, Prof. Agassiz, in support of Dr. Morton's theory as to the original diversity of the human races.

The paper by Agassiz is entitled, *Sketch of the Natural Provinces of the Animal World, and their Relation to the Different Types of Man.* It was drawn up by the writer from a conviction that much might be gained in the study of ethnography by observing the natural relations between the different races of man and the plants and animals inhabiting the same regions. The sketch given by him is intended to show, that "the boundaries within which the different natural combinations of animals are known to be circumscribed upon the surface of our earth coincide with the natural range of distinct types of man. Such natural combinations of animals circumscribed within definite boundaries are called *Faunæ*, whatever be their home—land, sea, or water." There are eight regions of the earth, according to Agassiz, each containing its own faunæ, and its own peculiar type of man; and his main conclusion from a consideration of these several faunæ is as follows: "That the diversity among animals is a fact determined by the will of the Creator, and their geographical distribution part of the general plan which unites all organized beings into one great organic conception; whence it follows that what are called human races, down to their specialization as nations, are distinct primordial forms of the type of man." Messrs. Nott and Gliddon, in their work quoted, appeal triumphantly to this theory of Agassiz in support of their view as to the primitive diversity of the races of mankind; and in a subsequent work, *Indigenous Races of the Earth* (Philadelphia, 1857), have inserted a further communication from the writer, in which, while he reiterates his formerly expressed opinion, that the races of man, so far as concerns their geographical distribution, are subject to the same circumscription as the other members of the animal kingdom, he observes: "Even if this fact stood isolated, it would show how intimately the plan of the animal creation is linked with that of mankind. But this is not all. There are other features, occurring among animals, which require the most careful consideration, inasmuch as they bear precisely upon the question at issue, whether mankind originated from one stock or from several stocks, or by nations. These features, well known to every zoologist, have led to as conflicting views respecting the unity or plurality of certain types of animals as are prevailing respecting the unity or plurality of the origin of the human races. The controversy which has been carried on among zoologists upon this point, shows that the difficulties respecting the races of men are not peculiar to the question of man, but involve the investigation of the whole animal kingdom—though, strange as it may appear, they have always been considered without the least reference to one another."

This theory of Agassiz, it must be stated, is very generally controverted, as likewise the opinions generally of Dr. Morton and the American school of E., partly on biblical, but chiefly on scientific grounds. Indeed, from the conflict of opinions as to the origin of the human race, if the solution of this question were the sole object of anthropology, the science might be said to be in a very unsatisfactory state. But this is not the case. The question at issue is one that may well be left in abeyance for the present. Without it, the field of inquiry is sufficiently wide, and is well cultivated by skilled laborers, who continually bring the product of their researches in physiology, geography, archæology, and comparative philology to enrich and fructify the newly turned-up soil.

Subjoined is a tabular view of the different races of mankind, according to the useful, if not absolutely perfect classification of Dr. Latham:

I. MONGOLIDÆ.

Physical Characteristics.—Face broad and flat; frontal profile retiring or depressed; maxillary profile moderately prognathic or projecting, rarely orthognatic; eyes often oblique; skin rarely a true white, rarely a jet-black; irides generally dark; hair straight, and lank, and black, rarely light-colored, sometimes curly, rarely woolly. *Languages*—aptotic and agglutinate, rarely with a true amalgamate inflection. See LANGUAGE. *Distribution*—Asia, Polynesia, America. *Influence upon the history of the world,* material rather than moral.

A. ALTAIC MONGOLIDÆ.—1. *Seriform stock,* embracing Chinese, Thibetans, Anamese, Siamese, Kambojians, Burmese, the Môn, and numerous unplaced tribes. 2. *Turanian stock,* embracing the Mongolian branch, the Tungusian branch, the Turk branch, and the Ugrian branch.

B. DIOSCURIAN MONGOLIDÆ.—1. Georgians. 2. Lesgians. 3. Mizjeji. 4. Irôn. 5. Circassians.

C. OCEANIC MONGOLIDÆ.—1. *Amphinesian stock,* embracing Protonesians, Polyne-

sians, Malegasi (?). 2. *Kelænonesian stock*, embracing the natives of New Guinea, New Ireland, Solomon's Isles, Louisade, New Caledonia, Australia, and Tasmania.

D. HYPERBOREAN MONGOLIDÆ.—1. Samöeids. 2. Yeniseians. 3. Yukahiri.

E. PENINSULA MONGOLIDÆ.—1. Koreans. 2. Japanese. 3. The Aino. 4. Koriaks. 5. Kamskadales.

F. AMERICAN MONGOLIDÆ.—Embracing the various native tribes of North and South America.

G. INDIAN MONGOLIDÆ.—1. Tamul. 2. Pulinda. 3. Brahui. 4. Indo-Gangetic. 5. Purbutti. 6. Cashmirian. 7. Cingalese. 8. Maldivian.

II. ATLANTIDÆ.

Physical Characteristics.—Maxillary profile projecting; nasal, generally flat; frontal, retiring; cranium, dolichocephalic; the parietal diameter being generally narrow; eyes rarely oblique; skin often jet-black, very rarely approaching a pure white; hair crisp, woolly, rarely straight, still more rarely light-colored. *Languages*, with an agglutinate, rarely an amalgamate inflection. *Distribution*, Africa. *Influence on the history of the world*, inconsiderable.

A. NEGRO ATLANTIDÆ.—Embracing various negro tribes.

B. KAFFRE ATLANTIDÆ.—Kaffre tribes, etc.

C. HOTTENTOT ATLANTIDÆ.—1. Hottentots. 2. Saabs. 3. Dammaras.

D. NILOTIC ATLANTIDÆ.—1. Gallas. 2. Agows and Falasha. 3. Nubians. 4. Bishari. 5. M'Kuafi, etc.

E. AMAZIRGH ATLANTIDÆ.

F. EGYPTIAN ATLANTIDÆ.

G. SEMITIC ATLANTIDÆ.—1. Syrians. 2. Assyrians. 3. Babylonians. 4. Beni Terah (Edomites, Jews, Samaritans, etc.). 5. Arabs. 6. Ethiopians. 7. Canaanites, etc.

III. JAPETIDÆ.

Physical Characteristics.—Maxillary profile but little projecting; nasal often prominent; frontal sometimes nearly vertical; face rarely very flat, moderately broad; skull generally dolichocephalic; eyes rarely oblique; skin white or brunette; hair never woolly, often light-colored; irides black, blue, gray. *Languages*, with amalgamate inflections, or else anaptotic; rarely agglutinate, never aptotic. *Distribution*, Europe. *Influence on the history of the world*, greater than that of either the Mongolidæ or the Atlantidæ, moral as well as material.

A. OCCIDENTAL JAPETIDÆ.—Kelts.

B. INDO-GERMANIC JAPETIDÆ.—1. *European class*, embracing Goths, Teutons (Mœso-Goths, High and Low Germans, Franks), Scandinavians, Sarmatians, Slavonians (Russians, Servians, Illyrians, Bohemians, Poles, Serbs), Mediterranean Indo-Germans (Hellenic branch, Italian branch). 2. *Iranian class*, embracing Persians, Kurds, Beluchi, Patans (Afghans), Tajiks, Siaposh, Lugmani, Dardoh, Wokhan. 3. *Unplaced stocks*, Armenians, Iberians, Albanians. 4. *Extinct stocks*, Pelasgi, Etruscans, populations of Asia Minor.

ETHYL (symbol, C_4H_5) is the starting-point of the family group, of which ordinary ether and alcohol are members.

Ethyl,	C_4H_5.
Ether,	C_4H_5O, oxide of ethyl.
Alcohol,	C_4H_5O,HO, hydrated oxide of ethyl.

It may be prepared by acting upon iodide of ethyl by granulated zinc, when the ethyl is liberated, and may be obtained as a colorless, inflammable gas, of an agreeable odor, insoluble in water, but soluble in alcohol.

ETHYLAMINE is a substance strongly resembling ordinary ammonia or hartshorn in odor and other properties. It is found in coal-tar, in the oil obtained during the destructive distillation of bones, in the gases evolved during putrefaction, and may be produced by certain complicated chemical processes. E. is a mobile liquid of specific gravity 696 (water = 1000), and boils at 66° F. It has a strong ammoniacal odor, has an alkaline action with coloring matters, forms white fumes with strong acids, and in composition is analogous to gaseous ammonia (NH_3 or NHHH), with one of the atoms of hydrogen replaced by ethyl (C_4H_5O or Ae), and is represented by the symbol NHHAe or NH_2Ae.

ETHYLENE, ETHENE, or BICARBURETED HYDROGEN. See OLEFIANT GAS, *ante*.

ETIENNE, ST., an important manufacturing t. of France, in the department of Loire, is situated on both banks of the Furens, an affluent of the Loire, in the center of a valuable and extensive coal-field, 30 m. s.s.w. of Lyons by rail, and about 288 m. s.s.e. of Paris. It is surrounded by coal-mines, is seated upon coal-deposits, and has galleries driven even beneath its streets. The stream on which the town is built furnishes invaluable water-power to move its machinery, and its waters are also of great use for tempering iron and steel. The old town of St. E. is badly built, and the new town, which has sprung up very quickly, is destitute of architectural harmony. The newer

houses are built of a fine white sandstone, and are frequently five and six stories in height; but they rapidly become tarnished and begrimed by the perpetual cloud of coal-smoke which hangs over the town. The most noteworthy building is the Hôtel-de-Ville, which contains the *Musée Industriel*, with specimens of the manufactures of the town, and of the minerals and fossils of the neighborhood. St. E. is famous for its manufactures of ribbons and firearms. The ribbon-manufactories contain 30,000 looms, and the annual value of their produce is estimated at 60,000,000 francs (£2,375,000) in value. They are unrivaled in elegance of design, and in richness and delicacy of color, and are exported to all parts of the world. There are extensive private manufactories of firearms, besides an imperial firearms manufactory, which supplies most of the muskets of the French army. St. E. has also extensive manufactures of bayonets, scythes, nails, saw-blades, foils, anvils, vices, files, and also of silks, velvets, lace, embroidery, muslins, glass, leather, and paper. From the coal-field on which St. E. is situated, about 600,000 tons of coal are raised annually. On the 1st Jan., 1856, St. E. was constituted the capital of the department, in place of the town of Montbrison. St. E. arose originally from a castle built in the 10th c. by the counts of Forez. It increased greatly in the 15th c., and in 1771 it had 20,000 inhabitants; in 1851, it had 49,614 inhabitants; in 1872, it had 80,526; and in 1876, 117,537 inhabitants.

ETIQUETTE' (Fr. a ticket, supposed to be from the Celtic *tocyn*, a little piece or slip —a token). Originally, E. signified a little piece of paper affixed to a bag or other object to signify its contents. The word came probably to possess the secondary meaning which we now attack to it, of the forms or decorums observed in the intercourse of life, more particularly on state occasions, from its having been customary to deliver such tickets, instructing each person who was to take part in the ceremony as to the part which he was expected to play. The cards which are still delivered to the mourners at funerals, and those on which the order of the dances is set forth at balls and evening parties, are of this nature. Popular publications are constantly issuing from the press for the purpose of teaching E., or the rules of behavior in good society. They will, for the most part, be found far less trustworthy than the promptings of nature, where the individual possesses a reasonable amount of reverence for others, and respect for himself. Yet there are certain conventionalities which can only be learned by instruction of some kind, or by observation, and the observation may be attended with unpleasant circumstances.

ET'IVE, a sea-loch in the n. of Argyleshire, running inland from the firth of Lorn, 20 m. e. and n.e., with a breadth of a quarter to three miles. It is bordered by granite in its upper part, and by trap in its lower. Near its mouth, there is mica-slate on the n. side, and permian strata on the south. The river Awe, the outlet of loch Awe, falls into the loch at the bend, where also is the ferry of Bunawe, and the small river Etive falls into it at its n.e. end. The loch abounds in seals, salmon, porpoises, and cod. The scenery around the upper half of the loch is grand and romantic. To the e. rise Ben Cruachan, 3,670 ft., and Ben Starive, 2,500 ft., and to the n. Ben Mahrgage. The loch admits small coasting-vessels. Ardchattan priory, founded in the 13th c., on the site of a monastery of the 6th or 7th c., is now in ruins. Connel ferry, in the lower part of the loch, and near a vitrified fort, is only 680 ft. broad, and is a very turbulent cataract, 3 or 4 ft. high at half-tide, caused by a sunken reef of rocks, partly bare at low water. At the s. side of the mouth of loch E., 3 m. n. of Oban, on a projecting conglomerate rock 10 to 30 ft. high, are the ruins of Dunstaffnage castle, the ancient stronghold of the Macdougals, a building in what is called the Edwardian style of the end of the 13th or beginning of the 14th c., with walls 400 ft. in circumference, 30 to 50 ft. high, and 10 ft. thick, and with three round towers. Dunstaffnage is supposed by some to have been the seat of the Dalriadic Scottish monarchy (see DALRIADA), and from this place the famous slab or stone of destiny (Lia Fail), now in the coronation-chair, Westminster abbey, is said to have been taken in 843 by Kenneth Macalpine to Scone, whence Edward I. removed it to London.

ET'NA, or ÆTNA (now MONTE GIBELLO), is the largest volcano in Europe. It is an isolated mountain, situated on the eastern coast of Sicily, and cut off from the chain of mountains which run parallel with the northern shore of the island, by a small valley, through which flows the Alcantara, and from the southern chain by a larger valley, which forms the basin of the Giaretta. Its eastern side rises directly from the Mediterranean, 30 m. of coast being formed by the streams of its lavas. Its base is almost 90 m. in circumference, and from this it rises like an immense cone to the height of 10,874 feet.

The history of E. does not carry us far back geologically; an active volcano in the later portion of the tertiary period, it continues still to pour forth materials; and the ejected ashes, dust, and lapilli, together with the streams of molten lava, have, in the course of untold ages, built up this immense mountain. One central crater has been the prevailing outlet for these materials, and they have consequently arranged themselves into one central and dominant mound—the cone-shaped E.; but innumerable secondary and surrounding craters, each forming, by its ejected matter, an external smaller cone, exist on Etna. Many of these, in the progress of the growth of the mountain, have been covered and hid by the more recent eruptions. Eighty of them may be

counted surrounding the upper portion of E., many being hills of considerable altitude, but all of them appearing only as trifling irregularities when viewed at a distance as subordinate points of so imposing and colossal a mountain. Seen from the summit, they present a beautiful aspect; some bare and barren, others covered with the dark and somber pine, or with the gayer and more varied foliage of the oak, the beech, and the hawthorn, and all arranged in picturesque groups of various heights and sizes. But the most remarkable feature in E. is the Val del Bove, an immense gully excavating the eastern flank of the mountain, 5 m. across, and surrounded by nearly vertical precipices from 1000 to 5,000 ft. high, on which are shown sections of innumerable lava-streams and beds of scoriæ, traversed by highly inclined dikes. It has a singularly dreary and blasted appearance.

The summit of E. rises considerably above the line of vegetation, and consequently presents, except where covered with snow, a dreary waste of black lava, scoriæ, and ashes, in the center of which, in a desolate plain, rises the crater-bearing cone. This is called the desert region. It is followed by 6 or 7 m. of the woody region, in which luxuriant forests of pine, oak, beech, poplar, and hawthorn abound, together with rich pasturage for herds and flocks. A varying breadth of from 2 to 11 m. of cultivated region surrounds the base of Etna. Its great products are corn, oil, wine, fruit, and aromatic herbs.

The first recorded eruption of E. took place 476 B.C. The most remarkable that have occurred since are the following: 1169 A.D., when Catania and 15,000 of its inhabitants were destroyed; 1527, in which two villages and many human beings perished; the eruption which continued at intervals from 1664 to 1673, and destroyed many villages with their inhabitants. Numerous chasms were formed at this time; from one several miles long and 4 or 5 ft. wide were emitted a bright light and strong sulphurous vapor; from another, black smoke and quantities of stones were given out; and from others, streams of lava. In 1673, an immense volume of salt (?) water rushed down the mountain: by some, it is supposed to have been ejected from the crater, but it is more probable that it arose from the sudden melting of the snows which covered the summit of the mountain. A very great eruption took place in 1852. Immense clouds of ash-gray dust were ejected. From two new mouths on the eastern flank there issued vast torrents of lava, one of which was 2 m. broad, and at one time as much as 170 ft. deep. The next outbreak, in 1864–65, was of trifling importance. That of May, 1879, was much more violent; the clouds of smoke and showers of ashes and scoriæ being followed by the ejection of a torrent of lava from 200 to 300 ft. in width, which desolated a large tract of highly cultivated land.

The minerals peculiar to volcanic rocks occur at E., such as chrysolite, zeolite, selenite, alum, niter, vitriol, copper, mercury, and spicular iron.

ETOLIA. See ÆTOLIA.

E'TON, a t. in the s. of Buckinghamshire, on the left bank of the Thames, 42 m. S.S.E. of Buckingham, and 22 m. W.S.W. of London, near the Slough station of the Great Western railway. It lies opposite to Windsor, in Berkshire, with which it is connected by a bridge over the Thames. Though in separate counties, these two towns really form one. E. chiefly consists of one long well-paved street, and is mainly dependent on the college. Pop. '71, 2,806, exclusive of the Eton boys.

ETON COLLEGE is one among the most famous educational establishments in England. It was founded in 1440 by Henry VI., under the title of "The College of the Blessed Mary of Eton beside Windsor." The original foundation consisted of a provost, 10 priests, 4 clerks, 6 choristers, 25 poor grammar-scholars, a master, and 25 poor infirm men. The king provided for the establishment out of his own demesne lands and the estates of certain alien priories. A supplementary charter was granted in 1441, in which year also the college buildings were commenced. Henry was very solicitous that the work should be of a durable kind. Some of the buildings were finished in 1443, and were handed over by the royal commissioners to the provost, clerk, and scholars. Political troubles of various kinds retarded the completion of the buildings till 1523. Bishop Waynfleete was the first head-master, and afterwards a munificent supporter of the college. The institution passed through much peril in the reign of Edward IV., and again in the time of the commonwealth; but it surmounted the dangers, and the increasing value of its estates brought in a large income.

The original foundation has been greatly modified under the public schools act, 1868. It now consists of a provost and 10 fellows, who constitute the "governing body," 2 chaplains or conducts, and 70 scholars. The members of the governing body are nominated by the universities of Oxford and Cambridge, and other learned and responsible electors. Several valuable scholarships at King's college, Cambridge, are filled up every year from among the scholars by competitive examination. There are also other scholarships and prizes open to all the members of the school, such as the Newcastle and Tomline scholarships, and prizes for modern languages, founded by the late prince consort. The scholars are lodged within the college walls.

The main portion of the establishment, however, numbering nearly 900, consists of the *oppidans*, students who live out of the college, and whose friends pay liberally for their education. The tuition is the same for them as for the *collegers* or scholars.

There are an upper and a lower school, managed by the head master and lower master, with a large staff of assistants. Considerable discussion has taken place within the last few years concerning the kind of education received at Eton, the cost at which it is obtained, and the enormous incomes derived by some of the officials. The course of education is still somewhat of the mediæval character, which regards Greek and Latin as the basis of all good education; but mathematics and natural science, under recent regulations of the governing body, receive a large share of attention. There is great prestige connected with the college.

The chief buildings of the college consist of the chapel, the hall, the library, the schools, the provost's and master's apartments, and the lodgings of the fellows, surrounding two quadrangles; together with the boys' library and sleeping apartments, in a cluster called the new buildings, attached to the northern side of the older group. The chapel is mostly of stone, the other buildings of brick; and the effect of the whole is very picturesque, as seen from the terrace of Windsor castle, on the other side of the Thames. The chapel is an especially beautiful object. The houses of the masters are generally fitted up for the reception of oppidans as boarders.

ET'OWAH, co. in n.e. Alabama, crossed by the Coosa river, and the Alabama and Chattanooga railroad; 650 sq.m.; pop. '70, 10,109—1708 colored. The surface is rough, with extensive forests, and fertile soil. Productions, corn, cotton, wheat, etc. Co. seat, Gadsden.

ETRU'RIA, TYRRHE'NIA, TU'SCIA, designated, at a period anterior to the foundation of Rome, nearly the whole of Italy, together with some of its most important western islands. Its northern part, from the Alps to the Apennines, was known under the name of Etruria Circumpadana; its southern, from the Tiber down to the gulf of Pæstum, or, according to some, to the Sicilian sea, under that of Etruria Campaniana; while the central portion, bounded on the n. by the Apennines and the river Macra, s. and e. by the Tiber, and w. by the Tyrrhenian sea, was called Etruria propria. The two first, however, did not long remain Etruscan territory, but were either reconquered by the surrounding tribes to whom they had originally belonged, or fell into the hands of new immigrants. No historical records of that brief period of any moment having yet come to light, they do not claim our attention; while Etruria proper, scanty though our information about it still be, deserves our interest in the highest degree. For its physical features, we refer the reader to Tuscany, Lucca, and the Transtiberine portion of the present papal dominions; and have only to remark, that vast expanses of that country, which now are either covered with deep forest, or are shunned on account of the malaria, were in those times fruitful, densely peopled regions. For political, or rather administrative purposes, Etruria proper was divided into twelve sovereign cities, or rather cantons, among which the most important were Tarquinii (Corneto), the cradle of the royal family of the Tarquins, who at one time wielded the scepter of Rome; Cære (Agylla, Cervetri), which, during the war of Rome with the Gauls, offered a refuge to the Roman Flamen Quirinalis and vestal virgins; Veii, the greatest and most powerful city of Etruria, with 100,000 inhabitants, which carried on seven wars with Rome; Clusium (Kamars, Chiusi), the chief of which, Porsena, as principal commander of the Etruscan troops, dictated a humiliating peace to Rome after she had expelled the Tarquins; Perusia (Perugia), destroyed in the Perusian civil war (40); Arretium (Arezzo), birthplace of Mæcenas. Of other not sovereign places may be mentioned Luca (Lucca), Pisæ (Pisa), on the Arnus, with the Portus Pisanus, now Leghorn, and Florentia (Firenze, Florence), on the Arnus.

To what nation the inhabitants—called Etruscans (=Exteri, strangers) or Tuscans in the Roman, Tyrrheni or Tyrseni (*Turrēnoi, Tursēnoi*) in the Greek, and Rasena (Tesne Rasne) in their own language—originally belonged, and what country they came from, is a question which was debated many hundred years before Christ, and is not settled yet. All the most ancient writers, save one of the most trustworthy, Dionysius of Halicarnassus, implicitly follow Herodotus, who—confounding them, perhaps, as is his wont, with the Lydian *Turrēnoi*, or inhabitants of the city of Tyrrha—pronounces them to be Lydians, although there is not the slightest similarity between these two nations, and although Xanthus, the Lydian historian, knows nothing whatever about a fabled famine of eighteen years' duration in Lydia, followed by an immigration to Italy under a prince Tyrrhenus. Dionysius himself offers no opinion; he calls them an indigenous race—which means nothing; and it is surprising that some modern investigators should, despairing of a rational solution of the old riddle, have fallen back upon this evasive theory of "autochthons." Thucydides, in first mixing up the Torrhebian pirates with the Pelasgian filibusters, gave rise to the most hopeless confusion about their very name. As to the innumerable theories and hypotheses that have been put forward since his day, we will only mention that while Ciampi and Collar hold them to be of Slavonic origin, Fréret calls them Celts; Micali, Albanese; Lami, Pfitzmaier, and Stickel, Semitics; and others variously make them Goths, Scandinavians, Basques, Assyrians, Phenicians, Egyptians, and Armenians. The most rational and generally accepted opinion is that of Niebuhr—modified more or less by Ottfried Müller, Lanzi, Lepsius, Steub—of their being, when they first appear in history, a mixture of an eastern tribe, which had settled for a while in the Rhætian Alps (the Tyrol of to-day), and Pelasgians, whom

they found in their new Italian seats; these latter having, in their turn, since their immigration, mixed with the Umbrians, the oldest historical inhabitants of those parts. But, as we said before, this is only the most rational opinion that rose out of an ocean of wild speculation: so far from any authentic proofs having been brought forward in its support, the question stands to-day precisely where it stood when Dionysius wrote:—"The Etruscans do not resemble any people in language and manners."

Immense as was their influence on Roman, and, in fact, on European civilization, very little is known with respect to their political history. Chiefly cultivating the arts of peace, they still seem, long after their heroic period, to have been powerful enough to scare away any invader, and this probably is the reason why historians have so little to record of them; but their decline may be said to stand in an inverted ratio to the rise of Rome. The 7th and earlier half of the 6th c. B.C. had been the most powerful and flourishing epoch of the Etruscan state in its widest sense—which then probably had been in existence for four or five hundred years. Whether they had put their Tarquinii as governors over conquered Rome, or whether, on the contrary, the reign of this Etruscan family would denote the subjugation of Southern Etruria by Rome herself, is not quite clear; but the expulsion of the last Roman king, Tarquinius (Tarchon), called Superbus, was followed, about 507 B.C., by a war between the Etruscans, under Porsena of Clusium, and the Romans, which, although ending in a most ignominious peace, dictated within the walls of Rome, did not bring about the restoration of the Tarquinian dynasty. From the wars between Veii and Rome, which began in 486, and ended—interrupted only by an occasional armistice—395 B.C., with the destruction of Veii, dates the gradual but sure extinction of Etruria as an independent state. The Gauls advancing from the north, the Etruscans were forced to conclude a forty years' truce with their adversaries at any price; but these over, and the Romans being engaged with the Samnites, the Etruscans recommenced the hostilities more fiercely than ever. In the course of this last war, the Romans succeeded, 309 B.C., under Q. Fabius Maximus, in twice defeating them, and Fabius crossed the Ciminian forest—the frontier sacred from time immemorial; and when, 283 B.C., P. Cornelius Dolabella had beaten both them and their Gallic auxiliaries in a decisive and sanguinary battle at the Vadimonian lake, Etruria became a Roman province; and about two hundred years later, the Lex Julia conferred upon her inhabitants, as a reward for their fidelity, the right of citizenship. Up to that time, they had succeeded in keeping up their own singularly distinct creed, customs, traditions, language—their nationality, in fact; when Sulla, 82 B.C., infuriated by the part they had taken against him, liberally bestowed great portions of their land upon his veterans; and some fifty years later, Octavianus planted his military colonies there. This wrought and completed the transformation of that mysterious conglomeration of heterogeneous races and tribes, hitherto called Etrurians, into Romans. Once more, well-nigh 2,000 years after its extinction, the kingdom of Etruria (Hetruria) rose before the eyes of the world. The peace of Luneville re-created it, and conferred it on the hereditary prince, Louis of Parma; after whose death, his widow, the infanta Louisa of Spain, administered the government for their son, Charles Louis, up to 1807, when it became a French province. From 1809, it again bore the name of the Grand Duchy of Tuscany; and to TUSCANY—which in our days forms a province of the Italian kingdom, as it did of yore—and to ITALY, we refer for its modern history.

We have spoken above of twelve cities as forming the confederacy of Etruria proper. Similar confederacies of twelve cities were established, independently of each other, in the two other Etrurias. The cities themselves, however, cannot be fixed now in all cases. From the fact of more than twelve autonomous ones being recorded in Etruria proper, it would appear that some among these twelve confederates, or *populi*, possessed more than one capital city, each populus, however, being limited to one representative vote in the general council. The members of the confederacy were bound to appear regularly at an annual religious assembly near the temple of Voltumna, a locality which we are as yet unable to point out. Here great fairs were held for the people; common operations of war being discussed by the *principes*, and a general-in-chief for the ensuing year elected from their number. Each city or canton, in the earlier times at least, had a king (Lucumo, Lauchme=Inspired), chosen for life, who at the same time acted as high-priest; and a hereditary nobility, which alone was eligible to the higher offices of state. Next to them, in the political and social scale, came the people, properly so called—free, not subject personally to the nobility; lowest stood a great number of clients or bondmen, probably the descendants of subjected original inhabitants. On the whole, the federal interdependence between the cities was far from close. Single cities carried on wars in which the others took no part; and when the confederacy resolved on general action, there were always some members which, for some reason or other, stood aloof. It appears from this that the Etruscan constitution was analogous to the Greek and Roman in their earliest stages: the community develops itself into a *polis* or city, chooses a head, or rather high-priest, and enters into a more or less intimate alliance with its neighboring cities; but, beside that king of its own, recognizes a common chief only in time of war.

The Etruscans were, as a people, less warlike than any of their neighbors, especially the Romans, and conspicuous is their want of anything like cavalry. Theirs was also the un-Italic custom of hiring soldiers, and their energies seem principally to have been

directed to the more profitable occupations of trade and agriculture. One of the chief articles of their commerce was amber, which Germans brought from the Baltic to Etruria Circumpadana, whence it was conveyed to Greece by sea. In the western parts of the Mediterranean, they were formidable as pirates; while they were welcomed by the Carthaginians and the Greeks of Magna Græcia, as importers of indigenous products of nature and art, which they exchanged for the wealth of the east and south. That their commerce within Italy must have been very extensive, appears from the fact, that all the states of central Italy adopted their system of coinage, based, like their tables of weights and measures, and many of their political institutions, on the duodecimal system.

The striking contrast between the Etruscans and their Italic and Greek neighbors, which appears in the short thickset frames, the large heads and bulky extremities of the former, and the slender limbs and graceful harmony in the whole structure of the latter, and which runs with equal distinctness through the intellectual lives of the three nations, manifests itself nowhere with greater power than in their religions. Equally distant from the abstract, clear rationalism of the Latins, and the plastic joyfulness of Hellenic image-worship, the Etruscans were, as far as their dumb fragments show—for what we find on them of human words we do not understand—chained in a dark and dotard mysticism, such as a blending of a half-forgotten eastern symbol-service with barbarous religious practices of northern savages, grafted upon archaic Greek notions, might produce. In their pantheon, the predominance belongs to the evil, mischievous gods; their prisoners are welcome sacrifices to the heavenly powers; they have no silent depths where the "good spirits" of their departed dwell, but a hell of the most hideous description, and a heaven where permanent intoxication is the bliss that awaits the virtuous. They divide their gods into two classes, and they place them in the most northern, and therefore most immovable point of the world, whence they can best overlook it. The upper section is formed by shrouded, hidden gods (Involuti), of uncertain number, who act awfully and mysteriously, and twelve lower gods of both sexes, called Consentes, Complices. Tinia (Zeus, Jupiter) is the chief of these latter, and stands between the two divisions of the gods, receiving orders for destruction from the upper ones, while the lower ones form his ordinary council, and obey his behests. Nine of these (Novensiles) hurl lightnings at various times and with peculiar effects. The three of these deities which seem to have been the principal objects of worship were Tinia himself, armed with three different kinds of lightning, Cupra (Hera or Juno) and Menrfa (Minerva, Pallas Athene). Gods most peculiarly Etruscan are Vejovis, an evil Jupiter, whose thunder-bolts have the power to deafen, and Nortia, the goddess of fate, also called Lasa Mean. Besides these, they put a host of demons over the different portions of the creation:—the heavens, the earth, and the lower regions (Penates, Lares, and Manes). Their deities have generally wings; and before the Assyrian bulls had come to light, some antiquaries established from this a connection with the Hebrew winged cherubim. Characteristic in the highest degree is their "disciplina" or art of "divination." This had been revealed by Tages, a grandson of Jupiter, who was dug out near Tarquinii, in the shape of a child-like dwarf with gray hair—a most striking caricature of these both childish and senile practices—and who died immediately after having communicated these mysteries. They were at first the property of the noble families; but in the course of time, as others were initiated, and schools for priests were founded, these mystical and awe-striking teachings came to be written down. It is saddening to observe here again in what monstrous insanities the spirit of man occasionally revels, and that, too, in the province of what is noblest and highest—religion. The "disciplina" was developed into an exact science, fully as minutely and casuistically sharpening its points and splitting its hairs as Hindu or Mohammedan theology would. It taught what gods hurled the different kinds of lightning; how, by the color and the peculiar quarter of the sky, the author of the bolt might be recognized; whether the evil denoted was a lasting or a passing one; whether the decree was irrevocable or could be postponed; how the lightning was to be coaxed down, and how it was to be buried. This was the specialty of the Fulgurales. The Haruspices had as their share the explanation of portents, prodigies, monsters, the flight and cries of birds, the entrails of sacrificial animals; while others ministered in the holy rites at the foundation of cities, the building of gates, houses, etc. Their ceremonies (a word derived from their town Cære) were endless and silly, but the show and pomp with which their priests knew how to surround these jugglerics, and from which the Romans largely borrowed, made them acceptable in the eyes of the herd; and although Rome herself, with all her augurs, called Etruria "the mother of superstition," there was a certain odor of tithes and fees about these rites which made many anxious to "preserve religion in its primeval purity."

In the entire absence of anything like a genuine Etruscan account, even the outlines of the relation between their religion and that of the Greeks on the one hand, and the Romans on the other, are exceedingly difficult to trace; so much, however, is certain, that they adopted and assimilated many points of archaic Greek theology, and clothed them in a garb of their own, and that this process was gone through and repeated still more completely by the Romans, in their turn, with respect to the religious notions of

the Etruscans. The articles on Greek and Roman religion will furnish further information on this point.

The high degree of civilization which the Etruscans possessed long before Rome was heard of, is testified by innumerable works of masonry and art. The Etruscans were of an eminently practical turn of mind, and domestic, like the north. Trusting to their priests for reconciliation with the gods, who always seemed irate, but whose angry decrees could easily be foreseen and averted, they set to work in developing the inner resources of the country, and in making the best use of their intercourse with foreign countries. They thus became eminent in agriculture, navigation, military tactics, medicine, astronomy, and the like; and in all these, as well as in some of the very minutiæ of their dress and furniture, the Romans became their ready disciples and imitators. The division of the year into 12 months, of the months into kalends and nones and ides, the designation of the numerals, were Etruscan; from the same source were derived the *toga prætexta* as well as the pomp of triumphs, the *lictors* and *apparitors*, down to the ivory curule chairs. The towns of the Etruscans were clean and healthy, owing to their perfect system of drainage and sewerage; they tunneled and excavated, they embanked and irrigated, they turned swamps into cities, changed the course of streams, and excelled in all kinds of useful public and private works. Their ideal was not the beautiful or the spiritual, but a comfortable, and, if possible, luxurious existence. As a special proof of their love for their own hearth, a quality probably imported from the north, we might adduce their invention of the atrium, the common sitting-room of the family, where the master of the house sat surrounded by his penates and the figures of his ancestors, while the wife and her handmaidens plied the labors of the loom or the distaff. As in the Germanic nations, woman stood in high estimation. She was the companion, not the slave of the husband, and thus had certainly not a little share in the softening of their primitive wildness, and in counteracting the somberness of their creed. That we find them even in their tomb-paintings engaged in convivial carousings, dancing, races, athletic games, and that they liked their very worship accompanied by the sound of flutes, horns, and trumpets, only shows that that glorious sky of theirs, their intercourse with the nations, their wealth and culture, had gradually caused their antique and gloomy austerity to wear off, even as it wore off with the Romans and other peoples; for to assume with some that the boisterous scenes to which we allude were caused more or less by the despair arising from the loss of their independence, would be going somewhat too far. Licentiousness is the sure forerunner of the fall of a nation, but a whole people does not take refuge in enjoyment when their all is lost. We know little of Etruscan literature; it seems to have consisted mostly of rituals, religious hymns, and some historical works. Whether the Fescennines, certain mocking-songs, sung in alternate verses, with musical accompaniment, at nuptials, originated with them or not, is not decided.

We have alluded to the high proficiency of this people in architecture; they were, in fact, so renowned in this craft throughout the antique world, that, as Solomon called Phenicians to Jerusalem to build his temple, so the Romans sought in Etruria the framers of their grandest masonic structures, such as the Cloaka Maxima, the temple of Jupiter on the capitol, etc. The peculiarly fantastic, and, withal, powerful mind which speaks in all their institutions, equally pervades their architectural productions; but, at the same time, everything they built, they built either for practical or pious purposes. We cannot here enter into a discussion of their manner as it appears in various epochs, but it never reached anything like a distinct national completeness, their eagerness to profit by foreign examples not allowing them to develop it to the full unalloyed. Of their walls and gates, temples and porticoes, theaters and amphitheaters, bridges and sewers, gigantic, and, in the earliest times, cyclopean—evidently erected, in eastern fashion, by hosts of slaves—very little is extant in so complete a form as to give us an exact insight into their mode of construction; and were it not for their tombs, our knowledge would be exceedingly limited. These form one of the most peculiar features in Etruscan antiquities. Hewn in rocks, either below the ground or in the face of a cliff, they were adorned outside with a somewhat Egyptian façade of a temple or a house, which the insides themselves most exactly reproduce, with all their internal decorations, furniture, and utensils. Of the paintings which run round the walls, and which are our safest and most complete guides to the inner life of this nation, we will say more presently. We must not, in conclusion, omit to mention that their temples bore in primitive times, and always retained, in some measure, so far as we can judge, the unfinished character of the wood-buildings of northern mountain tribes—a square, half-house, half-fortification, overloaded with quaint ornamentation.

In their plastic and pictorial arts, Winckelmann has established three distinct styles —to which Dennis has added a fourth—viz., the Egyptian, with Babylonian analogies, the Etruscan or Tyrrhene proper, the Hellenic, and that of the *decadence*. Characteristic of the first style are the prevalence of straight lines, right angles, faces of an oblong, contracted oval, with a pointed chin, eyes mostly drawn upwards, the arms hanging close to the side, the legs close together, the drapery long, in straight parallel lines, the hair disposed in tiers of curls. In this style, the attitude is constrained, the action stiff and cramped. The progress shown by the second style is the greater attention bestowed on the delineation of the muscles, which swell out in disproportionate prominences on the

now almost entirely nude body. The two remaining styles explain themselves. Their statuary, as it appears chiefly on sarcophagi and cinerary urns, suggests likewise an Egyptian origin. The figures are those of their own mystical and awful Hades, instead of the Bacchic processions of Greece and Rome. The grouping follows rather a pictorial than a plastic principle; the motion is hasty and forced; but the features of the deceased, hewn on the lid, have all the rude accuracy of a spiritless portrait. Statues of deities in wood and stone have indeed been found, but very rarely. Of high renown were their ornaments and utensils in baked clay (terra cotta), in the manufacture of which objects the Veientes were especially famous. Rome, at a very early period, possessed of this material a quadriga and the statue of Summanus, made by Etruscans. Of the art of working in bronze, the Etruscans were supposed to be the inventors: that they brought it to a very high degree of perfection, is evident from the examples which remain to us. Statues and utensils were manufactured and exported in immense quantities, not only to Rome, but to every part of the known world. Of figures on a large scale still extant, we may mention the renowned she-wolf of the capitol, the chimæra in the museum of Florence, the warrior of Todi in the Etruscan museum of the Vatican; a portrait-statute of an orator, with the inscription Aule Meteli, in Florence; and the boy with the goose at Leyden. The various objects of ornament and use, found in great numbers in tombs, such as candelabra, cups, tripods, caldrons, couches, disks; articles of armor, as helmets, cuirasses, etc.; musical instruments, fans, cists, or caskets, are most of them models of exquisite finish and artistic skill. Their gems are as numerous as those of Egypt, and like them, cut into the form of the *scarabæus* or beetle. They were exclusively intaglios, and of cornelian, sardonyx, and agate. On these the Etruscan artists represent groups from the Greek mythology, or the heroic cycle, bereft, as they seem to have been, of heroic legends of their own. They are most frequently found at Chiusi and Vulci, and were worn as charms and amulets. Special mention should be made of the metal *specula*, or mirrors, with figures scratched upon the concave side, the front or convex side being highly polished. These ranged over all the phases of Etruscan art, and are especially and peculiarly Etruscan. None but Etruscan inscriptions have ever been found upon them. They will, no doubt, prove eventually of the highest importance, not only by enabling us to follow the gradations of artistic development step by step, but by furnishing us with lists of names of gods and persons, and, it may be, of objects.

Of the vases and urns which are found in innumerable quantities in Etruscan tombs, we cannot treat here, as they are admitted on all hands to be, with very few exceptions, Greek, both in design and workmanship; we must refer the reader to the special article on VASES, but a few words may be added on the before mentioned tomb-paintings. They are found chiefly in the cemeteries of Tarquinii and Clusium; and they are all the more important, as they lead us with minute accuracy from the very cradle of the individual, through the various scenes of his entire life, to its close; and this throughout the existence of the nation itself, beginning before the foundation of Rome, and ending in the empire; while we follow the style in its gradual development from the Egyptian to Græco-Roman perfection. Life in its merriest aspects gleams in the most vivid of colors all round—dancing, feasting, loving, hunting. The Etruscans of later times had learned in the school of the Hellenes to dread death less, and to think of the other world as one of continued joyfulness.

The Etruscan language is preserved in more than 3,000 inscriptions, and this number will no doubt be doubled by the opening of new sepulchral chambers, with which the soil of ancient Etruria is teeming. These inscriptions are found on sarcophagi, urns, vases, columns, statues, and looking-glasses in bronze. The latter article was a favorite object for the representation of scenes from Greek mythology, and from this source we learn the names of the principal native deities. *Tinia*, was Jupiter; *Usil*, the sun; *Fufluns*, Bacchus; *Sethlans*, Vulcanus; *Thurms*, Mercurius; *Turan*, Venus; *Thalna*, Juno; *Thesan*, Aurora. Some of the minor female deities are called *Lasa*, *Maris*, *Mean*, *Vanth*. The inscriptions are of two kinds—the archaic and more recent. The former, generally beginning with the syllable MI, are distinguished not merely by a more ancient form of the alphabet, but also by a more refined condition of the language. In the older inscriptions consonants and vowels are evenly balanced. But in the documents of a later date, short vowels are generally omitted, and in consequence, combinations of consonants appear which remind us strongly of the cacophonous forms of some of the Slavonic languages. Compare the following specimens: 1. *Mi Tesantaiai Tarchumenaia.* 2. *Laris Sesctna Lumscial.*

With regard to the grammar, the following points may be considered as established. In the singular of nouns, the nominative ends in *s;* the genitive, according to the class of declension, in *a-s*, *e-s*, *i-s*, *u-s;* the dative in *si* or *s*. But these terminations are very often dropped, just as in early Latin. In the Cippus Perusinus, both the largest and best preserved inscription of all now in existence, we find of the proper names Velthina and Afuna the cases: *Velthina*, *Velthinam*, *Velthinas;* *Afuna*, *Afunam*, *Afunas*. The suffix *al* serves mostly, but not exclusively, for the expression of a metronymic. *Thana Seianti Latinial*, for example, is Thana Seiantia, *the daughter* of Latinia. Another very common suffix—*asa*, *esa*, *isa*, *usa*—designates the matrimonial relation of women. *Thana Aulnei Canznasa* is Thana Aulneia, the *wife* of Canzna; *Tha Setumnei Pumpunisa*

is Thana Setumneia, the *wife* of Pomponius. It is clear that this suffix consists of the genitives in *as, es, is, us,* with the addition of an *a,* so that grammatically and logically the wife is defined as part and parcel of her husband. Verbal forms do not occur often, but it is certain that the preterite is formed from the root by the addition of the syllable *ce,* like *tur-ce, the-ce, lupu-ce, sval-ce.* The numerals sound rather strange. *Mach, thu, zal, huth, ki, sa,* are 1 to 6; but as yet the individual meaning of each of these is unknown. The same must be said of *sespha, esal, mu* or *muv,* the numerals for 7 to 9. Decades are expressed by *alch(a)l,* e.g., *sespalchal, muvalchl, cealchl.* Ninety was probably *zathrums.* The meaning of about 10 or 12 words, such as *clan,* son; *sech,* wife; *avil,* age; *vril,* year; *hinthial,* spirit; *fleres,* statue, can be clearly established; but as yet no affinity has been discovered between these and the corresponding expressions in languages, whether Arian or otherwise. The following two inscriptions are given with a translation which in one or two points is conjectural:

Vipia Alsinai turce Versenas Caiia.
Vibia Alsinæa dedit Versenæ, Caiæ filiæ.

The second is found on the celebrated bronze statue of the orator, now preserved in the museum of Florence:

Aulesi Metelis Ve Vesial clensi cen fleres tece
Aulo Metello Veliæ Vesiæ filio hoc signum posuit

sansl tenine tuthines chisulics.
jussu concilii publici magistratus (?).

The few bilingual inscriptions (altogether 15) throw no light on the language, as they contain only proper names. The so-called Tyrrhenian glosses, preserved in the lexicon of Hesychius, are worse than useless for critical purposes.

ETRUSCAN LANGUAGE. See ETRURIA, *ante.*

ETSCH. See ADIGÉ.

ETTLINGEN, the chief t. of the circle of Carlsruhe, Germany, on the railway between Manheim and Basel, 4½ m. from Carlsruhe; pop. '75, 5,286. It has manufactures of paper, cotton, starch, powder, etc. There is an old castle built on the site of a Roman fortress. Ettlingen was conquered in 1644 by Taupadel; and near the town, in 1796, Moreau was defeated by the archduke Charles. Roman antiquities are found in the neighborhood.

ETTMÜLLER, ERNST MORITZ LUDWIG, an able writer on German antiquities, was b. 5th Oct., 1802, at Gersdorf, in Upper Lusatia, and studied medicine at Leipsic from 1823 to 1826, but subsequently the language and history of his native country. In 1830, having taken his degree of PH.D. at Jena, he began to deliver lectures there on the German poets of the middle ages; in 1833, he was called to the Zürich academy, and in 1863, to the university there, as professor of German literature. E.'s literary activity has been exhibited chiefly in the editing of the literary remains of the Middle High-German, and older Low-German dialects. To the former belong his *Sant Oswaldes Leben* (Zürich, 1835); *Hadeloubes Lieder und Sprüche* (Zürich, 1840); *Heinrich's Von Meissen des Frouwenlobes Lieder, Leiche, und Sprüche* (Quedlinb. 1843); *Frowen Helchen Süne* (Zürich, 1846); *Heinrich's Von Veldecke Eneide* (Zürich, 1852). Of poems composed in Low German he published, among others, *Theophilus* (Quedlinb. 1849); and *Wizlâwes IV., des Fürsten Von Rügen, Lieder und Sprüche* (Quedlinb. 1852). In 1850 appeared, under his editorship, an Anglo-Saxon chrestomathy; in the following year his much-valued *Lexicon Anglo-Saxonicum.* E. has also given attention to the old Norse literature, as is shown by an edition of the *Völuspâ,* translations, and a Norse reading-book. E. has further written several original poems: his *Deutsche Stammkönige* appeared at Zürich in 1844; his *Kaiser Karl d. Gr. und das Fränkische Jungfrauenheer* in 1847; and his *Karl d. Gr. und der Heilige Goar* in 1852. *Herbstabende und Sommernächte* are essays on his favorite subjects (3 vols., 1865–67).

ETTRICK, a pastoral vale in the s. of Selkirkshire, watered by the Ettrick river, which rises amid bleak hills in the s.w. corner of this co. near Ettrick Pen, 2,258 ft. high, and runs 28 m. n.e., and falls into the Tweed. Its chief affluent is the Yarrow, which runs 25 m. from the w., through one of the loveliest of Scotch vales, and the scene of many a plaintive song. Ettrick forest, a royal hunting tract, swarming with deer till the time of James V., included Selkirkshire and some tracts to the north. In Ettrick Vale, at Tushielaw, dwelt the celebrated freebooter or king of the border, Adam Scot, who was summarily executed by James V. The district derives some note from two persons in modern times—Thomas Boston (q.v.), a Scottish divine, who was minister of the parish of E.; and James Hogg, the Scottish poet, who, having been originally a shepherd in this part of the country, became known as "the Ettrick shepherd."

ETTY, WILLIAM, R.A. This distinguished artist was b. at York, Mar. 10, 1787. His father was a miller and spice-maker. Before he was 12 years of age, he was apprenticed to a printer, and served out his dreary term of seven years, the irksome drudgery of which he himself often afterwards was in the habit of narrating, occasionally soothed by dreams of, on some future day, being an artist. Freed at last, and assisted by some relatives, in 1805, at the age of 18, he entered on the study of art, and, after a year's

probation, was admitted as a royal academy student. His career is very interesting and instructive. It exhibits one gifted with enthusiasm for art, high resolutions, and great industry and perseverance, for a series of years invariably surpassed by many of his fellow-students, and, as has been recorded, "looked on by his companions as a worthy plodding person, with no chance of ever becoming a good painter." Neither prizes nor medals fell to his share as a student; and for several years his pictures were rejected at the royal academy and British institution exhibitions. It was only after six years of hard study that he obtained a place for a picture in the exhibition of the royal academy; and his works only began to attract notice in 1820, when the artist was 33 years of age, and as he himself has said, "having exhibited nine years to no purpose." But the circumstance of E.'s genius being so long unappreciated, did not so much arise from his works evincing no talent, as from his class of subjects, and those technical qualities for which his works are remarkable, not being appreciated at the time; for long before his pictures were salable, his powers were highly appreciated by his professional brethren. On his return from Italy in 1822, where he had been studying the great Venetian colorists, he was elected an associate of the academy. In 1824, his *chef-d'œuvre*, "The Combat—Woman pleading for the Vanquished," was purchased by an artist, John Martin. In 1828, he was elected academician by the members of the royal academy; while in the same year the royal Scottish academy testified its high appreciation of his talents by purchasing the most important of his efforts, the historical work illustrating the history of Judith and Holofernes. Testimonials so high soon had their effect; E.'s pictures came into great request, and brought large prices, and he was enabled amply to repay those who, trusting to his energies, had assisted him when he entered on the contest, in which, after so arduous a struggle, he gained so much honor. He always cherished a love and reverence for York, his native city, and had retired there some time previous to his death, which took place on Nov. 30, 1849.

E. had an exquisite feeling for color, which he most assiduously cultivated by studying the great Venetian masters, and constantly painting from the life; and though, in his drawing, carelessness and incorrectness may often be observed, it is never vulgar, and often possesses much elevation and largeness of style. He generally chose subjects that afforded scope for color, in which the nude and rich draperies were displayed. He executed nine pictures on a very large scale, viz.: "The Combat;" series of three pictures illustrating the delivery of Bethulia by Judith; "Benaiah slaying two Lion-like Men of Moab"—these five, which are the best of his large works, were purchased by the royal Scottish academy, and are now in the Scottish national gallery—"The Syrens," now in the Manchester institution; and three pictures illustrating the history of Joan of Arc. His smaller works are numerous. Besides his large works above referred to, he sent for exhibition to the royal academy and British institution, between 1811 and 1849 inclusive, no less than 230 pictures, many of them composed of numerous figures, and all remarkable for exquisite color. The following may be particularly noted: "The Coral-finders;" "Venus and her youthful Satellites arriving at the Isle of Paphos;" "Cleopatra's Arrival in Cilicia;" a composition from the eleventh book of *Paradise Lost* ("Bevy of Fair Women"); "The Storm;" "Sabrina;" "The Warrior Arming;" "Youth at the Prow, and Pleasure at the Helm;" "The Dance," from Homer's description of Achilles's Shield; "Britomart redeems Fair Amoret;" "Dance on the Sands, and yet no Footing seen;" "Amoret Chained."—Compare E.'s life by Gilchrist (Bogue, London, 1855).

ETYMOLOGICUM MAGNUM, a Greek lexicon of unknown authorship, said to be the oldest extant in that language. It is thought to have been made in the 10th century.

ETYMOLOGY (Gr.) is that part of grammar that treats of the derivation of words. It embraces the consideration of the elements of words, or letters and syllables, the different kinds of words, their forms, and the notions they convey; and lastly, the modes of their formation by derivation and composition. Etymological inquiries have formed a favorite pursuit from the earliest times. In the book of Genesis, numerous indications are given of the derivation of proper names. Homer also attempts etymologies of the names of gods and men, which, however, can only be looked upon as more or less ingenious fancies. The grammarians of Alexandria and Varro among the Romans tried to base their etymologies on something like principle; but the wildest conjectures continued to be indulged in, and the results were little better than guess-work down to a very recent period. As philology extended its sphere, and became acquainted with the languages and grammarians of the east, who far excelled those of the west in this particular, etymology took on a new form. It no longer sought the relations of the words of a single language exclusively within itself, but extended its view to a whole group, e.g., the Teutonic, or wider still, to a whole family, as the Indo-European, or Aryan (q.v.), and became a new science under the name of comparative grammar. See PHILOLOGY.

Etymologicum Magnum is the name of a Greek lexicon, the oldest of the kind, professing to give the roots of the words. It appears to belong to the 10th c.; the author's name is unknown. The etymologies are mere guesses, sometimes right, often wildly absurd; but the book is valuable, as containing many traditions and notices of the meanings of old and unusual words. There is an edition by Schäfer (Leip. 1816); one

by Sturz, called *Etymologicum Gudianum* (Leip. 1818); and another by Gaisford (Oxf. 1849).

EU, a tolerably well-built t. of France, in the department of the Lower Seine, in Normandy, situated near the mouth of the Bresle, 93 m. n.n.w. of Paris. It is remarkable for its fine Gothic church, and for the château d'Eu, a low building of red brick, with high tent-shaped roofs of slate. E. manufactures sail-cloth, ropes, soap, lace, and silk. Pop. '76, 4,169. In the 11th and 12th centuries, E. was in the possession of the counts of the same name, a collateral branch of the Norman royal family. After various vicissitudes, it was purchased by Mademoiselle de Montpensier in 1675, whose fanciful taste has perpetuated itself in the architecture and decoration of the château. At a later period, it came into the possession of the duke of Maine, from whom it passed to the duke of Penthièvre, the maternal grandfather of Louis Philippe, who succeeded to it in 1821. Louis Philippe expended large sums on the embellishment of the château, and especially on its magnificent park and the unique portrait-gallery. It has besides acquired a new historical association through the visits of the queen of England in 1843 and 1845. The eldest son of the duke of Nemours (born 29th April, 1842) received from his royal grandfather the title of Count d'Eu. Compare Vatout, *Le Château d'Eu, Notices Historiques* (5 vols., Paris, 1836), his *Résidences Royales* (Paris, 1839).

EU, Prince Louis Philippe Marie Ferdinand Gaston d'Orleans, Compte d', b. France, 1842; eldest son of duke de Nemours and grandson of Louis Philippe. In 1864, he was married to Isabel, heiress-apparent of the throne of Brazil. He is a marshal in the Brazilian army, and was commander-in-chief of the allied forces in the war with Paraguay in 1869. He defeated Lopez, and proclaimed the abolition of slavery in Paraguay.

EUBŒ'A (ancient, *Euboia;* Turkish, *Egripo;* Ital. *Negroponte*), the largest island in the Ægean sea, forms a portion of the present kingdom of Greece. Until recently, it was called Negropont. It is bounded on the n. by the Trikeri channel, and on the w. by those of Talanta and Egripo. It extends in a direction parallel to the mainland; is 105 English statute m. long, and 30 m. in extreme breadth, although in one part its breadth is scarcely 4 miles. At the narrowest part, it is connected with the mainland by a bridge. The island is intersected by a chain of mountains, running n.w and s.e., and attaining in the center, in the range of Mt. Delphi, an elevation of about 4,500 feet. Copper and other metals are obtained in the island, which also contains numerous hot springs. The pastures are excellent, and the declivities of the mountains covered with forests of fir-trees, The climate is salubrious, the valleys well watered and very fertile, but little cultivated. The chief products are cotton, oil, wine, wheat, fruit, and honey. The inhabitants are chiefly engaged in the breeding of cattle; they export wool, hides, and cheese, as well as oil and grain. The chief towns are Chalcis (q.v.) on the n., and Carystos on the s. coast, the latter having a population of 3,000. E. was peopled in the early historic times chiefly by Ionic Greeks, and afterwards by colonists from Athens, who formed a number of independent cities or states. These were at first monarchical in their constitution, but at a later period democratic. They soon rose to power and prosperity. After the Persian wars, however, E. was subjugated by the Athenians, under whose rule it continued till they, in their turn, were subdued by Philip of Macedon. By the Romans, it was finally united with the province of Achaia under Vespasian. In 1204, it came into the possession of the Venetians, and received the name of Negroponte. In the year 1470, the island was taken by the Turks, in whose hands it remained till 1821, when the inhabitants rose to vindicate their independence at the call of the beautiful Modena Maurogenia. It now forms a portion of the modern kingdom of Greece, and has a population of (1870) 82,541.

EUBU'LIDES, a philosopher of Miletus and contemporary of Aristotle, whose philosophy he attacked with great severity. Demosthenes is said to have been one of his pupils. He is not known to have written any independent work.

EUCALYP'TUS, a genus of trees of the natural order *myrtaceæ*, suborder *leptospermeæ*, containing a large number of species, mostly natives of Australia, and which, along with trees of nearly allied genera, form one of the most characteristic features of the vegetation of that part of the world. The genus occurs also, although much more sparingly, in the Malayan archipelago. The trees of this genus have entire and leathery leaves, in which a notable quantity of a volatile aromatic oil is usually present. The leaves, instead of having one of their surfaces towards the sky, and the other towards the earth, are often placed with their edges in these directions, so that each side is equally exposed to the light. Many of the species abound in resinous secretions, and are therefore called Gum Trees in Australia. Some of them attain a great size; some are found with trunks from 8 to 16 ft. in diameter; a plank 148 ft. in length was exhibited at the great exhibition of 1851. They are of very rapid growth; and their timber, when green, is soft, so that they are easily felled, split, or sawn up; but when dry, it becomes very hard. It is used for a great variety of purposes, amongst which may be mentioned ship-building. The bark of many of the species abounds in tannin, and has become to some extent an article of commerce. Some kinds of it are said to be twice as strong as oak-bark. The bark of some is remarkable for its hardness; whilst some throw off their outer bark in

longitudinal strips or ribbons, which, hanging down from their stems and branches, have a very singular appearance.—Among the resinous secretions of this genus is the substance called BOTANY BAY KINO, which is used in medicine as a substitute for kino (q.v.). It is the produce of *E. resinifera*, a species with ovato-lanceolate leaves, known in Australia as the RED GUM TREE and IRON BARK TREE, a very lofty tree, attaining a height of 150–200 ft. When the bark is wounded, a red juice flows very freely, and hardens in the air into masses of irregular form, inodorous, transparent, almost black when large, but of a beautiful ruby red in small and thin fragments. Botany bay kino is said to consist chiefly of a peculiar principle called *eucalyptin*, analogous to tannin. About sixty gallons of juice may sometimes be obtained from a single tree, or, in the course of a year, as much as five hundred pounds of kino.—*E. robusta*, STRINGY BARK TREE, also a lofty tree, yields a most beautiful red gum, which is found filling large cavities in its stem, between the concentric circles of wood.—*E. mannifera* yields, from its leaves, an exudation resembling manna, less nauseous, and of similar medicinal properties. It contains a saccharine substance, different from *mannite*, from *glucose*, and from all previously known kinds of sugar. Another similar exudation, from the leaves of *E. dumosa*, is sometimes seen spread over large districts like snow, and used by the natives as food.—The Tasmanian blue gum tree, which is one of the eucalypti, has recently acquired great reputation for its effects in drying marshy soils, and in preventing malarious diseases. It is extremely rapid in its growth, which may account for its drying powers; and this, in its turn, may partly account for its salubrious effects; although its camphor-like odor may also have to do with it. It has been tried with decidedly beneficial effects in the cape of Good Hope, Algeria, the Roman Campagna, and elsewhere. Unfortunately, it does not bear a severe winter.

EUCALYPTUS (*ante*). Eucalyptus has recently had a popular reputation as an efficient remedy in intermittent fever. More than forty years ago the crew of a French war vessel were treated, it is said, successfully with eucalyptus, at Botany bay. Peasants of Valencia, a Spanish province, were found using it in 1867. Dr. Ramel, of Valencia, wrote of it to a brother physician in the highest terms as a febrifuge. In 1871, Dr. Keeler, a physician to some railways, reported that he found it as efficient as cinchona, and others have regarded it highly as a remedy for the pernicious form of intermittent (see INTERMITTENT FEVER). Other physicians do not find the same virtues, and others, again, account for this by the fact that different species have been employed; the *E. latifolius* failing where the *E. longifolius* succeeds. A report of Dr. Burdel of France, whose observations were made in the marshy department of La Sologne, where malarial fever prevails extensively, states that out of 123 cases only 11 were cured without relapse, and these were treated in a hospital. It was moreover observed that in those cases where the paroxysms were broken, the malarial cachexia remained. On the whole, the virtues which have been claimed for eucalyptus do not seem to be regarded by the majority of the medical profession as having been verified.

EUCHARIST. See LORD'S SUPPER.

EUCHLO'RINE is a very explosive green-colored gas, possessing bleaching properties, and is prepared by heating gently a mixture of 2 parts hydrochloric acid, 2 of water, and 1 of chlorate of potash. It explodes when merely touched with a hot wire, and is most likely composed of a mixture of chlorine and chlorochloric acid ($2ClO_5,ClO_3$).

EUCHRE, a game of cards said to be of German origin, but now very popular as a social pastime in the United States. Thirty-two cards are used in E., the twos, threes, fours, fives, and sixes being rejected in a complete pack. Before the game is started the players cut for deal, which belongs to him who first draws a knave or the lowest card according to agreement. The non-dealer then cuts to his opponent, who deals five cards to each, by two at a time and three at a time or vice versa. The dealer turns up the top of the undealt cards for trumps. In suits not trumps the cards rank as at whist; in the trump suit the knave (termed the right bower) is the highest trump, and the other knave of the same color, either black or red (termed the left bower) is the next highest, this card being, of course, omitted from the suit to which it would otherwise belong. The other trumps rank as already stated, the queen being next above the ten. The best form of the game is when played by four persons, but two, three, or even more than four persons may play, if the rules be adapted accordingly. In two-handed euchre the non-dealer looks at his hand and decides whether he will play it. If he be satisfied and think he can make three tricks, he "orders up." The dealer then discards his lowest and least useful card, and is entitled to take the trump card into his hand; in this case, however, he must succeed in taking three tricks, or he is "euchred," and his opponent scores two points. If the non-dealer be not satisfied with his hand, he says "pass." The dealer then has the option of taking up the trump as before, or of passing also. If the trump be ordered up or taken up, the play of the hand commences; if both players pass, the dealer places the trump card face upwards underneath the pack, called "turning it down." The non-dealer has then the privilege of naming the suit which shall be trumps, which must be another than that previously turned up. If he "make" a trump, he must succeed in taking three tricks or he is euchred; but if he pass it again, the dealer has the option of making it. If both pass a second time, the hand is thrown up, and the other player deals. When the card turned up is red and

the trump is made red, it is called "making it next;" the same with black. If the trump be made of a different color from the turn up, it is called "crossing the suit." If the hand be played, the non-dealer leads; the dealer plays to the card led. He must follow suit if able, otherwise he may play any card he pleases. If the left bower is led, a trump must be played to it. The highest card of the suit led wins the trick; trumps win other suits. The winner of the trick leads to the next. If a player make all five tricks he scores a "march," equal to two points; if he make three or four tricks he scores one point. In three-handed euchre the option of playing or passing goes to each in rotation, beginning with the player to the dealer's left. Three cards, one from each hand, constitute a trick. The player who orders up, takes up, or makes the trump, plays against the other two, and if they succeed in euchring him, each of them scores two points. This is often termed "cut-throat euchre," because any one of the three players is liable to be opposed by the other two. Four-handed euchre is generally played with partners, who are cut for, and sit opposite each other as at whist; if a player have a strong hand he can decide to "play alone" single-handed against the two adversaries, and his partner cannot object. Should the lone player succeed in making a march he scores four; if he win three or four tricks he scores one; if he fail to win three tricks the opponents score two. The popularity of euchre in this country is due mainly to its simplicity and mirth-provoking qualities. It is played in many different ways, as the game is not bound by any strict set of rules. Sometimes a blank card called "little joker" or "the joker" is added, and is the highest card in the pack, the bowers following; sometimes it is agreed upon to allow the player who makes more than five points to carry the surplus (called a lap) to the next game; or to allow a "lone player" to call for his partner's best card.

EUCLASE, a silicate of alumina and glucina occurring in greenish crystals; it is hard, and will bear a high polish, but is fragile and not much used in jewelry. It is found in South America.

EUCLID, of Megara, a Greek philosopher, has often been confounded with the mathematician of the same name. He was one of the earliest disciples of Socrates. Although Megara lay at a considerable distance from Athens, and all Megarians were forbidden to enter the Athenian territories under pain of death, E. came into the city in the evening in female disguise, to enjoy the instruction of Socrates. After the death of his master, he established a school of his own, which received the name of the Megaric school. His death took place about 424 B.C. The basis of his system was in the Eleatic dogma of a one, only, universal substance or existence. Blending with this the Socratic idea of the predominance of the moral element, E. held this one real existence to be *the good,* though it receives various names under its special manifestations.

EU'CLID, sometimes called the father of mathematics, was b. at Alexandria, about 300 B.C. We know little more of his history than that he belonged to the Platonic school of philosophy, and taught mathematics in the famous school of Alexandria, during the reign of Ptolemy Soter. Though he did not create the science of mathematics, as is sometimes represented, he made prodigious advances, especially by his rigorous method and arrangement. In this respect he has perhaps never been excelled, and his *Elements of Geometry* continue to the present day to hold their place as a text-book of that science. Besides the Elements, there are extant treatises on music, optics, data, etc., ascribed to E., the authenticity of some of which is doubtful. The best editions of the whole reputed works of E. are those of David Gregory (Oxf. 1703) and Peyrard (3 vols., Par. 1814–18). The oldest Greek edition of the Elements appeared at Basel, 1533; the best is that of August (2 vols., Berlin, 1826). Of English editions of E.'s Elements, those of Simpson and Playfair are considered the best. There is a full account of everything connected with E. and his works in Smith's *Dictionary of Greek and Roman Biography.*

EUDIOM'ETER (Gr. *eudios,* good, and *metron,* measurer) is an instrument originally introduced as a measurer of the goodness of air in any locality, but which is now employed generally in the analysis of gases for the determination of the nature and proportions of the constituents of any gaseous mixture. The instrument is now made of glass in the form of a tube, which is hermetically sealed at one end, and open at the other. The tube may be straight, or bent in the shape of the letter U. In either case, the tube is graduated or marked off in equalized divisions from the closed end onwards, so as to admit of the volume of gas placed within being accurately measured; and two platinum wires are inserted through the glass near the shut end of the tube, and closely approach, but do not touch, each other. These wires are intended for the conveyance of electric sparks through any mixture of gases, so as to cause the combustion of certain of them. For the modes of manipulating with the eudiometer, see GAS, ANALYSIS OF.

EUDO'CIA, the name of several Byzantine princesses, of whom the most important is the wife of the emperor Theodosius II. She was the daughter of the sophist Leontius or Leon, and was educated by her father, who instructed her in the literature of Greece and Rome, in rhetoric, geometry, arithmetic, and astronomy. Her accomplishments and her singular beauty were reckoned by Leontius a sufficient fortune, for at his death

he left all his property to her two brothers. E. appealed to the emperor at Constantinople. Pulcheria, the sister of Theodosius, was interested in the maiden, and thought she would make a suitable wife for the emperor. But as E. (or, more properly, Athenais, for this was her name until her baptism) had been brought up a pagan, it was necessary first to convert her. This was easily accomplished. E. was married to the emperor in 421 A.D. For many years, however, Pulcheria ruled in the imperial household and councils, E., according to Nicephorus, "submitting to her as mother and Augusta;" but in 447, a quarrel broke out between them in regard to the Eutychian heresy, of which E. had become a supporter. At first, E. was triumphant, and Pulcheria was banished; but in a short time the emperor was reconciled to his sister, and treated E. so sharply that she retired to Jerusalem, where she died 460–61 A.D. Her latter days were spent in works of piety and charity. She enriched churches, rebuilt the walls of the holy city, and founded many monasteries and hospitals. Through the influence of the famous Symeon Stilites, she was induced to renounce Eutychianism, and become an orthodox Catholic Christian. E. was a poetess of considerable merit. She wrote a poem in heroic verse on the victory obtained by the troops of Theodosius over the Persians, 421 or 422 A.D.; a paraphrase of eight books of Scripture, a paraphrase of Daniel and Zechariah; and a poem in three books on the history and martyrdom of Cyprian and Justina. The authorship of *Homero-Centones* has also (but without sufficient reason) been attributed to her. This is a work composed of verses taken from Homer, and so arranged as to appear a history of the fall of man and of his redemption by Christ. It has been often published.

EUDOX'US, of Cnidus, called by Cicero the prince of astronomers, flourished about 366 B.C. He studied under Plato for some time, and afterwards went to Egypt, where he resided for thirteen years, and had much intercourse with the Egyptian priesthood, from whom he is supposed to have derived his superior knowledge. His last years are said to have been spent on the summit of a high hill, that he might have the starry heavens ever before his eyes. There is little reason for believing that E. deserves any great admiration for his attainments in astronomy. He probably introduced the sphere into Greece, and may have corrected the length of the year, upon Egyptian information, but he appears to have been an indifferent observer of heavenly phenomena, and Delambre considers that he was ignorant of geometry. E.'s works are entirely lost, and our only reliable sources of information regarding him are the poem of Aratus and the commentary of Hipparchus.

EUFAU'LA, a city in Barbour co., Ala., on the Chattahoochee, at the junction of the Montgomery and Eufaula, the Georgia Southwestern, and the Vicksburg and Brunswick railroads; 80 m. e.s.e. of Montgomery; pop. '70, 3,185. It is an important cotton shipping point, and has considerable manufacturing business.

EUGENE, FRANÇOIS (le prince François-Eugene de Savoie-Carignan), better known as prince Eugene, equally distinguished as a gen. and as a statesman, was b. at Paris, 18th Oct., 1663. He was the son of Eugene Maurice, count of Soissons, and of Olympia Mancini, a niece of cardinal Mazarin. He was intended for the church; but the banishment of his mother to the Low Countries, by the orders of Louis XIV., was so deeply resented by him, that he indignantly renounced his country, and entered the service of the emperor Leopold as a volunteer against the Turks. Subsequently, the French government made him the most flattering offers, but he never returned to the service of his native country. He displayed extraordinary military talent in the Turkish war, especially at the famous siege of Vienna in 1683, and soon rose to a high position in the army. In the coalition war against Louis XIV. in Italy, he took an active part; and in 1691, was raised to the command of the imperial army in Piedmont. On his return to Vienna, he was placed at the head of the army of Hungary, and defeated the Turks, with immense slaughter, in the famous battle of Zenta, Sept. 11, 1697. The booty obtained was almost incredible, amounting to several millions sterling. In 1701, broke out the Spanish war of succession. E. for two years commanded the army of Italy, but his forces were too small for him to accomplish anything of importance. In the year 1703, being appointed president of the council of war, he became thenceforth the prime mover of every undertaking. He first took the command of the imperial army in Germany, and along with Marlborough gained a brilliant victory at the battle of Blenheim, 13th Aug., 1704, when the two commanders defeated the French and Bavarian army. E. afterwards saved Turin, and expelled the French from Italy in the year 1706. He shared, too, with Marlborough the glory of the fields of Oudenarde (in 1708) and Malplaquet (in 1709); but being crippled in his resources by the retirement of Holland and England from the contest, he was unable to withstand the enemy on the Rhine, and his defeat by Villars at Danain, 24th July, 1712, was followed by other disasters, until the peace of Rastadt put an end to the war. In 1716, on the recommencement of the war against the Turks, E. defeated an army of 180,000 men at Peterwardein, took Temeswar, and in the year 1717, after a bloody battle, gained possession of Belgrade. After the peace of Passarowicz, which was concluded in the following year, he returned covered with glory to Vienna, where, during the succeeding years of peace, he labored with unwearied energy in the cabinet. When the question of the succession to the throne of Poland brought on a new war with France, E. appeared

again on the Rhine; but being now advanced in years, and destitute of sufficient resources, he was unable to accomplish anything of importance. After the peace, he returned to Vienna, where he died, 21st April, 1736. E. was small in stature, with thin face, and long nose; he was simple in dress and manner, and indulged profusely in snuff. An enthusiast in his profession, and a strict disciplinarian, he was also kind-hearted and sympathetic, and always carefully attended to the wants of his men. He introduced no new tactics in the art of war, and was deficient in the guidance and command of masses; but by his rapidity of perception and decision, and faculty for making the best of existing circumstances, which was his *forte*, he raised the *prestige* of the Austrian arms to an eminence unequaled before or since his time. He successively served under three emperors, of whom he was wont to say, that in Leopold I. he had a father, in Joseph I. a brother, and in Charles VI. a master. E.'s political writings, published by Sartori, are important for the light they throw upon the history and manners of the time. Compare Dumont, *Histoire Militaire du Prince Eugene;* Ferrari, *De Rebus Gestis Eugenii* (Rome, 1747); Campbell's *Military History of Prince Eugene and the Duke of Marlborough;* and the monographs of Kausler (1838), Arneth (1858), and Von Sybel (1861).

EUGE'NIA, a genus of plants of the natural order *myrtaceæ*, nearly allied to *myrtus* (see MYRTLE), and differing only in having a 4-parted instead of a 5-cleft calyx, four instead of five petals, and a 1 to 2-celled berry, with one seed in each cell. The species are trees and shrubs, natives chiefly of tropical and sub-tropical countries. The dried fruit of *E. pimento* and *E. acris* forms the spice well known as allspice, Jamaica pepper, or pimento (q.v.). The seeds of *E. tabasco* are also used as a condiment. Other species yield some of the finest fruits of tropical regions, remarkable for their delicious balsamic odors. Among these is the MALAY APPLE (*E. malaccensis*), a native of the Malayan archipelago and of the South Sea islands, a low tree, with ovate-oblong smooth leathery leaves, and fruit in size and shape resembling a small apple, of a beautiful red color, and with a white juicy pulp. This fruit has an agreeable odor, like that of the rose, whence it is sometimes called ROSE APPLE; a name which, on the same account is often extended to the fruits of allied species, as *E. aquea*, and which is very often given to the JAMBOS or JAMROSADE (*E. jambos* or *jambosa vulgaris*), an East Indian fruit, now cultivated in all tropical countries. This fruit is pear-shaped, about the size of a hen's egg, white or red. The tree is about 20 or 30 ft. high, much branched, with leaves somewhat like those of the peach, and greenish-yellow flowers in terminal bunches. *E. cauliflora*, a Brazilian species, cultivated in most of the gardens of the diamond and gold districts of the s. of Brazil, yields a very fine fruit of a black color, about the size of a greengage plum, called the JABUTICABA or JABOTICABUROS. Similar fruits are produced by other Brazilian species, particularly *E. dysenterica*, *E. inocarpa*, and *E. Braziliensis*. The BASTARD GUAVA (*E. pseudo-psidium*) and the CAYENNE CHERRY (*E. cotonifolia* and *E. Michelii*) produce fruits which are held in considerable esteem in the West Indies. One species only, the UGNI (*E. ugni*), a native of Chili, appears to be sufficiently hardy for the climate of Britain; it endures at least that of the s. of England; it has been recently introduced, and much extolled as a fruit shrub. Its flowers are very fragrant, and its fruit pleasant. It is much cultivated in Chili, and a very refreshing beverage, with an agreeable balsamic odor, is made of the expressed juice mixed with water. The fruit is of the size of a black currant, somewhat flattened, and of a brownish-red color.—The bark of many species of E. is very rich in tannin. Some produce good timber.

EUGENIE-MARIE DE GUZMAN, formerly empress of the French, was b. at Granada in Spain, 5th May, 1826, and is the second daughter of the count of Montijo and of Marie Manuela Kirkpatrick. She is descended, on the father's side, from an old and noble Spanish family, which, by marriages at various times, acquired the right to assume the names of Guzman, Fernandez, Cordova, La Cerda, and Levia, and contracted alliances with the noble families of Téba, Banos, and Mora. By her mother—also born in Spain, and the daughter of Mr. Kirkpatrick, who was for some time English consul at the Spanish seaport of Malaga—she is connected with an ancient Scottish family—the Kirkpatricks of Closeburn—which still exists, but no longer in possession of their original property. She was educated principally at Madrid, and spent a great portion of her youth in traveling with her mother, under the name of the countess de Téba. In 1851, she appeared at the *fêtes d'Elysée* in Paris, where her beauty and graceful demeanor attracted the notice and excited the admiration of the emperor of the French, who married her on the 30th Jan., 1853, at Notre Dame. On that occasion an amnesty was granted to 4,312 political prisoners. In 1859, Eugenie-Marie de Guzman filled with ability the office of regent. During the war in 1870, Eugenie-Marie de Guzman was again regent, but had to flee to England after the emperor became a captive. Her only son, the prince imperial, born 16th Mar., 1856, completed his military education in England, and was killed in 1879 while serving as a volunteer in the Zulu war.

EUGE'NIUS is the name of four popes, of whom the last is the most important. E. IV., a native of Venice, became pope in 1431. The great event in his career was the schism created in the church by the proceedings of the council of Basel, which had been convoked by E.'s predecessor, Martin V., and showed a strong tendency to ecclesiastical

reform. E. was kept in perpetual trouble by this council, and at last, having been compelled to flee from Rome, opened a new council at Ferrara in 1438, and issued a bull of excommunication against the bishops assembled at Basel, whom he pronounced to be "a satanic conclave, which was spreading the abomination of desolation into the bosom of the church." The result was, that the council of Basel formally deposed him from his pontifical office in 1439, and elected in his stead Amadeus VIII., duke of Savoy, under the title of Felix V. The conduct of France and Germany seemed to warrant this bold step, for Charles VII. had introduced into the former country the decrees of the council of Basel, with some modifications, through the pragmatic sanction (1438), and the same thing happened in Germany by means of the deed of acceptance (1439). At the council of Ferrara, John Paleologus II., emperor of Constantinople, and upwards of 20 Greek bishops, presented themselves, and a union between the two great divisions of Christendom—the Greek and Latin church—was for a moment effected in July, 1439. Discord, however, broke out almost immediately, and the two have ever since remained separate. E.'s rival, Felix, did not obtain much recognition, and after the death of the former at Rome, in 1447, he had to give way in favor of Nicholas V. E.'s pontificate was stormy and unhappy, and in his old age he is said to have regretted that he ever left his monastery.

EU'GUBINE TABLES (Lat. *Tabulæ Eugubinæ*), the name given to seven bronze tablets, the inscriptions on which present a comprehensive and very remarkable memorial of the Umbrian language. They were discovered in 1444 at Gubbio (the ancient Iguvium or Eugubium), where they are still preserved. The characters on four of the tablets are Umbrian, on two Latin, and on one partly Latin and partly Umbrian. The *language* employed, however, is in all cases the same, and differs both from Etruscan and Latin, but resembles somewhat the older forms of the latter, and also the Oscan dialects, so far as we know them. The subjects of the inscriptions are directions concerning sacrificial usages and forms of prayer, and they seem to have been inscribed three or four centuries before the Christian era. Philip Bonarota first published them in a complete form in Dempster's *Etruria Regalis* (2 vols., Florence, 1723–24). The first really judicious attempt at interpretation was that of Lanzi, in his *Saggio di Lingua Etrusca* (3 vols., Rome, 1789), who points out the important fact that they related to sacrificial usages, etc. His views have been carried out by Ottfried Müller in his work *Die Etrusker;* Lepsius, *De Tabulis Eugubinis*, etc. The most accurate copy of the inscriptions is that given by Lepsius in his *Inscriptiones Umbricæ et Oscæ* (Leip. 1841); the best and most complete work on the language and contents of the tablets is that of Aufrecht and Kirchhoff, entitled *Die Umbrischen Sprach. Denkmäler* (2 vols., Berlin, 1849–51).

EULENSPIEGEL, the hero of a *Volksbuch* or German popular comic tale, often alluded to by various old authors, entitled the *Story of Tyll Eulenspiegel*, which relates the freaks, pranks, drolleries, fortunes, and misfortunes of a wandering mechanic. "It were long to detail his fearful jokes, which sometimes brought him to the gallows, yet saved him from the halter. He was buried with his coffin standing on one end at Möllen, near Lübeck; and you may see his grave under the great lime-tree in the churchyard, and his rebus, to wit, an owl and a looking-glass, cut upon the stone." Ulenspiegel, as he is sometimes called in German, has almost made the tour of Europe. His life was first published in the Nether-Saxon dialect, in 1483. Our English translation of *The merrye jests of a man that was called Howleglass, and of many marveylous thinges and jestes that he did in his life in Eastland*, was "Imprinted at London in Tamestreete, at the Vintre, in Three Craned Warfe, by Wyllyam Copeland."

A High-German version, the work of Thomas Murner, the Franciscan monk, was printed at Strasburg in 1519. A Latin translation was made by Nemius, and numerous French translations have appeared of the book. An English edition was published in 1860, under the direction of Kenneth R. H. Mackenzie, and with illustrations by Alfred Crowquill. There is no complete copy of the original, but portions in the royal library at Vienna and the royal library at Berlin complement each other.

EU'LER, LEONARD, one of the greatest of mathematicians, was b. at Basel, April 15, 1707, and received his first instructions in the science, for which he afterwards did so much, from his father, who was pastor of the neighboring village of Riechen. At the university of Basel, he studied under John Bernouilli, and was the friend of Daniel and Nicholas Bernouilli. At the age of 19, he was second in the contest for a prize offered by the academy of Paris for the best treatise on the masting of ships. His friends, the Bernouillis, had been called to St. Petersburg by Catharine I., when she founded the academy, and they now induced E. to settle in that capital, in 1730, as professor of physics. Three years later he exchanged his professorship for a place in the academy. From that time he continued to labor in the field of mathematics with an ardor really astonishing. More than half the mathematical treatises in the 46 quarto volumes published by the St. Petersburg academy from 1727–83 are by E., and at his death he left more than 200 treatises in MS., which were afterwards published by the academy. The Paris academy of science awarded him the prize on ten several occasions, one of which was his treatise on Tides, 1740. In 1741, he accepted the invitation of Frederick the great to Berlin. He afterwards, 1766, returned to St. Petersburg,

where he was made director of the mathematical department of the academy, and died Sept. 7, 1783. The last years of his life were spent in total blindness.

E. was of an amiable and religious character, always cheerful and good-humored; in society, he was distinguished for his agreeable wit. It was doubtless his residence in St. Petersburg that led him to the application of mathematics to the building and management of ships, as embodied in his *Théorie de la Construction et de la Manœuvre des Vaisseaux* (Petersb. 1773). The great problems left by Newton to his successors were the objects of his unceasing research. On physical subjects, E. often adopted extremely untenable hypotheses. He occupied himself also with philosophy in the proper sense of the word. He undertook to prove the immateriality of the soul, and to defend revelation against freethinkers. In his *Lettres à une Princesse d'Allemagne sur quelques Sujets de Physique et de Philosophie* (3 vols., Berl. 1768; new ed., Par. 1812; and which have also been translated into English), he attacked Leibnitz's system of monads and of a pre-established harmony. But this was not the field in which he was best calculated to shine; his proper domain was the abstruser parts of pure mathematics. His most important works of this class are his *Theory of Planetary Motion; Introduction to the Analysis of Infinites; Institutions of the Differential and of the Integral Calculus;* and *Dioptrics;* which are all, as well as his *Opuscula Analytica,* in Latin. His *Introduction to Algebra* is well known.

EU'MENES, 360–315 B.C.; a native of the Thracian Chersonesus; private secretary to Philip of Macedon, and also to his son Alexander the great, under whom he was a commander of the cavalry. After Alexander's death, the provinces and armies were divided among his generals, and the countries assigned to Eumenes were Cappadocia and Paphlagonia, with the sea-coast of Pontus as far as Trapezus; but as they were not yet subdued, Leonnatos and Antigonus were charged by Perdiccas to put Eumenes in possession. Antigonus disregarded the order, and Leonnatus, having in vain endeavored to induce Eumenes to accompany him to the assistance of Antipater in Europe, made an unsuccessful attack on Eumenes's life. But Eumenes escaped and joined Perdiccas, who assisted him in getting possession of Cappadocia. He did not rule long, having the enmity of many powerful generals. He was betrayed by his own soldiers, and put to death.

EUME'NIDÉS (literally, the well-minded or benign goddesses) was the euphemistic name of certain fearful beings, whose true name of erinnyes (from *erino,* I hunt up, or *erinuo,* I am angry) it was considered unlawful to utter. Their Latin name was *furiæ* or *diræ.* We find them mentioned by the earliest poets, and they play a prominent part in the writings of the tragedians, where their sphere of action is much extended. In the earliest times, Homer and Hesiod represent them as avenging and punishing perjury and murder, as also the violation of filial duty and of the rite of hospitality; they were also regarded as goddesses of fate (like the parcæ), and had a share in the grim providence which led the doomed ones into the way of calamity. A part of their function was also to hinder man from acquiring too much knowledge of the future. In these poets, their number is sometimes undefined; sometimes they appear as one. The limitation to the number three, as well as their names Alecto, Megæra, and Tisiphone, is of a later period, a whole chorus of erinnyes appearing in the writings of Æschylus. According to Homer, they dwelt in Erebus, and with this the duration after death of the punishments which they inflict is connected. Hesiod calls them the daughters of Ge and Uranus. Æschylus describes them as having the features of gorgons and harpies, their bodies covered with black, serpents twined in their hair, and blood dripping from their eyes. The later poets and sculptors represented them in the more pleasing form of winged virgins, attired in the garb of huntresses, bearing torches in their hands, and with a wreath of serpents round their heads. Gradually, they came to be considered goddesses of the infernal regions, who punished crimes after death, but seldom appeared on earth. In Athens, their worship, which, like that of the other infernal deities, was conducted in silence, was held in great honor. The sacrifices offered to them were black sheep and libations of *nephalia*—i.e., honey mixed with water. The turtle-dove and the narcissus were sacred to them. They had a sanctuary in the vicinity of the Areopagus, and one at Colonus.

EUMOL'PUS (the "sweet singer") was, in the later mythology of Greece, the son of Poseidon and Chione. He was brought up in Ethiopia, whence he went to Thrace, and afterwards passed into Attica, at the head of a body of Thracians, to assist the Eleusinians in their war against Erechtheus, king of Athens. E. and his sons are said to have been slain in battle. He is spoken of as the founder of the Eleusinian mysteries. A distinction is made by some of the ancient writers between this E. and a son of Musæus bearing the same name. The latter is represented as a scholar of Orpheus, and the instructor of Hercules; but E.'s history, like all mythological stories, is involved in great obscurity and confusion. The name of E. is one of the series of those old priestly singers who, by the institution of religious ceremonies, spread culture and morality among the rude inhabitants of Hellas. An illustrious Athenian family, the *Eumolpidæ,* derived their descent from E., and held the office of priests of Demeter in Eleusis.

EUNAPIUS, b. 347 A.D.; a Greek sophist, and enemy of Christianity. He possessed some knowledge of medicine, and was a teacher of rhetoric at Athens. He wrote *Lives of the Sophists*, and a continuation of the history of Dexippus.

EUNOMIUS, the founder of the Arian sect of Eunomians, was b. in the village of Dacora, in Cappadocia, and was first a lawyer, then a soldier, and ultimately took holy orders. In 360, he was appointed bishop of Cyzicum. In the great controversy regarding the nature of the Trinity which raged during the 4th c., E. was conspicuous by his advocacy of the view that the Father alone was eternal and supreme; that the Son was generated of Him; and the Holy Spirit, again, of the Son. His doctrine of the Trinity is sometimes called the *anomoian* ("dissimilar"), to distinguish it, on the one hand, from the *homoiousian* ("similar"), held by the semi-Arians, and, on the other, from the *homoousian* ("identical"), held by the Athanasian or Trinitarian party. It was thus the extreme of Arianism. In defense of his peculiar views, E. is said to have shown superior ability, although his opponents also accuse him of being verbose and inflated in his style. His life was much checkered. He was banished from one place to another, until at length he obtained permission to retire to his native village, where he died in 394. His writings have entirely perished, with the exception of a fragment here and there preserved in the writings of his adversaries.

EUNOMIUS, b. Cappadocia early in the 4th c.; leader of a sect of Arians who took his name. He was bishop of Cyzicus in 360, but was afterwards deposed for heresy by the bishop of Antioch. His writings were held in high esteem by his followers, and were so much dreaded by the orthodox that more than one imperial edict was issued for their destruction. His heresy was formally condemned by the council of Constantinople.

EUNUCH. The original signification of this word (Gr. *eunuchos*, one who has charge of a bed) points to the office that this class of persons fulfilled, and still fulfill in the east—that, namely, of taking charge of the women's apartments or harems. The barbarous practice of employing castrated males as guardians of the other sex, is an accompaniment of polygamy, and is therefore chiefly met with in the east and in n. Africa. If it has appeared in countries where monogamy was the law, it was in consequence of the introduction of oriental luxury, as was the case under the Roman emperors. The practice is of great antiquity, and seems to have originated in Libya, and from that to have spread to Egypt and the east. Syria and Asia Minor were the most notorious in this respect. In Greece, it never obtained any great footing; for although Greek women were kept in seclusion, polygamy itself never prevailed. The later Romans kept eunuchs, but they were mostly imported. In the Byzantine empire, on the contrary, castration and keeping of eunuchs were very prevalent. This class played a prominent part in the court of the eastern empire, and the word E. came to be the title of an office similar to that of chamberlain. In modern times, the practice is mostly confined to Mohammedan countries, and the eunuchs are chiefly brought as slaves from the interior of Africa.

EUOMPHALUS, a large genus of fossil gasteropodous shells, characterized by its depressed and discoidal shell, with angled or coronated whorls, five-sided mouth, and very large umbilicus. The operculum was shelly, round, and multi-spiral. The genus seems related to *trochus*. It appears among the earliest tenants of the globe, and keeps its place till the triassic period. No less than eighty species have been described.

EUONYMUS. See SPINDLE TREE.

EUPATORIA (formerly *Koslov*), a thriving maritime t. of Russia, in the government of Taurida, is situated on a bay in the w. coast of the Crimea, 15 m. n.w. of Old Fort, and 38 m. n.w. of Simferopol. The town stands on the border of a monotonous pastoral steppe, and is surrounded by low hills. Seen from the sea, it presents, with its occasional minarets and its houses roofed with red tiles, a somewhat picturesque appearance. The principal building is the Tartar mosque, built by Devlet-Ghiri Khan in 1552, and reckoned the finest in the Crimea. E. exports corn, wool, and salt. Its harbor is shallow, and is sheltered only from the n. and n.e. winds. Pop. '67, 7,730, mostly Crim-Tartars and Jews, who are engaged chiefly as farmers and shepherds, and possess an immense number of oxen and sheep, and a large area of badly cultivated land.

On the 14th Sept., 1854, a portion of the Anglo-French invading army landed here, and occupied and fortified the town. It was also the scene of a battle between the Russians and Turks, 17th Feb., 1855, in which the latter were victorious.

EUPATORIUM, a genus of plants of the natural order *compositæ*, sub-order *corymbiferæ*, having small flowers (heads of flowers) in corymbs, florets all tubular and hermaphrodite, club-shaped stigmas, imbricated bracts, a naked receptacle, and a hairy pappus. The species are numerous, and mostly American. One only is British, the common HEMP AGRIMONY (*E. cannabinum*), a slightly aromatic perennial plant, growing mostly in marshy places, and on the banks of streams. The root was formerly employed as a purgative, and the plant was also used as a diuretic and as a vulnerary. —THOROUGH-WORT (*E. perfoliatum*), a species having the opposite leaves joined at the base, is very common in low grounds in North America, and is a popular medicine,

much esteemed and used in that country. It is often administered in intermittent fevers. It acts powerfully as a sudorific, and is often very beneficial in catarrh and influenza. It is also emetic and purgative, and, in small doses, tonic. The whole plant is very bitter.—Other North American species possess similar properties, and the root of one, known as GRAVEL-ROOT (*E. purpureum*), is employed as a diuretic for relief of the disease from which it derives its name.—The AYAPANA (*E. ayapana*), a half-shrubby species, native of the n. of Brazil, has a high reputation in that country as a cure for snake-bites, and has been introduced into the East Indies. It is a very powerful sudorific, and is also diuretic.—The famous Peruvian vulnerary, MATICO, has been referred, but uncertainly, to a shrubby species of this genus, *E. glutinosum*.—GUACO or HUACO, much valued in Peru as a cure for snake-bites, is supposed to belong to the allied genus *mikania*.

EU'PEN, a flourishing manufacturing t. of Rhenish Prussia, is situated in a beautiful valley on the Weeze, within 2 m. of the Belgian frontier, and 9 m. s.s.w. of Aix-la-Chapelle. It is well built and open, including within its limits several gardens and meadows. There are four churches in the town—three Roman Catholic and one Protestant, also a convent, a high-school, and an orphan-house. E. has the most flourishing woolen manufactures of any town in Prussia, and has also dye-works, machine-making, and other manufactures. It owes the prosperity of its manufactures chiefly to a number of French refugees, who settled here after the peace of Lunéville. Pop. '75, 14,895.

EU'PHEMISM (Gr. *eu*, well, and *phemi*, I speak) is a figure of rhetoric by which an unpleasant or offensive matter is designated in indirect and milder terms. Thus, instead of directly calling up an unpleasant image by the word *died*, we say, "he was gathered to his fathers." The ancients used a multitude of euphemisms, to avoid words that were thought to be ominous of evil, or offensive to the unseen powers. They spoke, for example, of the Eumenides, or "benign goddesses," instead of the Furies; just as the elves and fairies of modern superstition are spoken of as "good neighbors."

EU'PHON, or EU'PHONON, a musical instrument invented by Chladni in 1790. It is similar in tone to the harmonica, and, like it, the tone is produced from the sounding body by the finger direct, without mechanism, and is regulated in quality and effect by the taste and feelings of the performer, who can produce tones from the most delicate pianissimo to fortissimo. In 1822, Chladni exhibited an improved E. of which a detailed description is given by himself in the Leipsic *Musik-zeitung* of that year, p. 805.

EUPHORBIA, OIL OF, or OIL OF CAPER SPURGE, an extremely acrid fixed oil, obtained by expression, or by the aid of alcohol or ether, from the seeds of the caper spurge (*euphorbia lathyris*), a plant common in many parts of Europe, and naturalized in some places in Britain. See SPURGE. Oil of euphorbia has much resemblance to croton oil in its properties, although less powerful, and is sometimes used as a substitute for it, in doses of from three to ten drops. It is good for use only when recently extracted.

EUPHORBIA'CEÆ, a very extensive natural order of exogenous plants, containing upwards of 2,500 known species—trees, shrubs, and herbaceous plants. They abound chiefly in warm countries, and most of all in tropical America. The few species found in the colder parts of the world are all herbaceous. The common box reaches a more northern limit than any other shrubby species. The other British species are different kinds of spurge (*euphorbia*) and dog's mercury (*mercurialis*). The E. usually abound in an acrid and poisonous milky juice; although there are species of which the juice is bland or becomes bland through the application of heat, so that their leaves may be used as food. The leaves in this order exhibit great diversities. The inflorescence is also various. Amongst those most remarkable for the acridity of their juice are the MANCHINEEL (q.v.) and *excœcaria agallocha*, an East Indian tree—formerly supposed to yield one of the kinds of aloes-wood—the smoke from the burning of which is extremely dangerous to the eyes. The juice of many of the spurges is also very acrid. Many of the E. are valued for their medicinal properties, different parts of the plant being in some instances employed, and in some the resins and oils which they yield. Thus the juice of some of the spurges, the roots or bark of the roots of others, the bark of different species of *croton* (cascarilla bark, copalche bark), etc., are used in medicine; and to plants of this order we are indebted for euphorbium, oil of euphorbia, castor oil, croton oil, etc. A few of the E. yield balsamic products of exquisite fragrance (see CROTON); a few, although their juice is poisonous, yield a wholesome starch in considerable abundance (see MANIOC); a few are cultivated and used as pot-herbs, particularly species of *plukenetia* in the East Indies; a few yield wholesome and agreeable sub-acid fruits, as *cicca disticha* and *C. racemosa* in the East Indies; the seeds of some are eatable, as those of the candle-nut (q.v.), of *omphalea diandra*, a Jamaica tree, and of *conceveiba Guianensis*, the latter being esteemed particularly delicious; the oil of the seeds is also in some cases used for food, like other bland oils (see CANDLE-NUT); but more frequently it is used for burning, as castor oil, candle-nut oil, the oil of *elæococca verrucosa* in Japan and Mauritius, and the concrete oil of *stillingia sebifera*, which is used in China for making candles, and in medical preparations as a substitute for lard.

—The dye-stuff called Turnsole (q.v.) is obtained from a plant of this order; and a bright red is imparted to silk by the roots of *rottlera tinctoria*, a native of Circassia, and by a red powder with which its seed-vessels are covered. The timber of some of the E. is valuable. African teak (q.v.) belongs to this order. The red-colored wood of *stylodiscus trifoliatus* is used in Java for making masts. Some of the E. are often cultivated in gardens and hot-houses, more frequently for their curious appearance than for their beauty; but the large deep crimson bracts of *poinsettia pulcherrima*, a native of Madagascar, make it a very attractive plant.

EUPHORBIUM, an extremely acrid gum resin, obtained from several species of *euphorbia* or Spurge (q.v.), as *E. officinarum* and *E. antiquorum*, in the n. of Africa, Arabia, and the East Indies, and *E. canariensis* in the Canary islands. It is obtained by incisions in the branches, whence issues a corrosive milky juice, which dries in the sun, and becomes a yellowish-gray waxy gum resin. The persons who collect it are obliged to defend their mouths and nostrils by a cloth, as its particles produce incessant sneezing, violent inflammation of the nostrils, and a very painful burning sensation in the mouth. On account of its excessive acridity, it is now less used in medicine than formerly; although it is still occasionally mixed with burgundy pitch or other substances to make rubifacient plasters for chronic affections of the joints; its alcoholic tincture is used as a caustic in carious ulcers, and its powder, mixed with much starch or flour, as an *errhine* in chronic affections of the eyes, ears, or brain. It was formerly administered as an emetic and drastic purgative, but is dangerously violent in its action.

EUPHRA'NOR, a sculptor and painter of Greece in the 4th c. B.C. One of his finest works in sculpture was a figure of Paris, a copy of which is in the Vatican. His chief painting was extant at the time of Pausanias. It represented on one wall of a temple the twelve gods, and on the other wall Theseus as the founder of the equal polity of Athens.

EUPHRASIA. See EYEBRIGHT.

EUPHRATES (in the oriental languages, *Frat*, *Phrat*, or *Forat*) is the largest river in western Asia, and, with the Tigris, forms the most important river-system of that quarter of the world. It has its source in the heart of Armenia in two branches—the Kara Su and the Murad, of which the former rises 25 m. n.e. of the town of Erzerum, and flows s.w. to a point 10 m. n. of Keban' Ma'den, where it is met by the Murad, which rises on the southern slope of Alá Tagh, and flows w.s.w. to the point of confluence. From Keban' Ma'den, the E. flows in a general southern direction, with a tendency, however, to struggle westward towards the Mediterranean. In this part of its course, it breaks through the Taurus, and flows among the mountains for 45 m., emerging at Sumeisat, whence it continues navigable to the sea—a distance of 1195 m.—and passing Bir, at which point it is 628 ft. above the level of the Mediterranean, and 100 m. distant from its nearest shore. After passing Samosta, it changes its direction, and flowing s., separates for a considerable distance Mesopotamia from Syria and the deserts of Syrian Arabia. Curving to the s.e., it flows on without receiving almost any tributaries for about 700 m., until it is joined at Kurnah or Kornah by the waters of the Tigris. From Kurnah, the river, taking the name of the Shatt-el-Arab, continues to flow in a s.e. direction, until, after being united by a canal with the Karun from the mountains of Persia, it empties itself, by several arms, into the Persian gulf, 90 m. below Kurnah. The total length of the E. is 1600 m.; the area drained by all the waters which enter the Persian gulf by the Shatt-el-Arab, is 108,000 m.; and the volume of water discharged by it is 401,010 cubic ft. per second, or 72,910 cubic ft. more than that discharged by the Danube in the same time. The average width of the Shatt-el-Arab is upwards of 600 ft.; it is navigable in mid-stream for vessels of 500 tons.

The water of the E., although muddy, is not unwholesome. Its inundations, caused by the melting of the snows, take place chiefly from the beginning of Mar. till the end of May; and in ancient times, when canals and embankments regulated these inundations, exercised the same beneficial effect on the country as those of the Nile on Egypt. See BABYLONIA.

EUPHROSYNE (i.e., the joyous one), one of the Graces (q.v.).

EUPHUISM (Gr. *euphues*, of vigorous growth; eloquent), a term used in English literature to denote an affected and bombastic style of language, fashionable for a short period at the court of queen Elizabeth. The word was formed from the title of the book which brought the style into vogue, the *Euphues* of John Lyly (q.v.).

EUPIONE (Gr. *eu*, good, and *pion*, oil) is an extremely mobile oil, obtained from the lighter portions of the liquid products of the destructive distillation of wood (wood-tar), coal (coal-tar), and animal matter, and in the distillation of rape-seed oil. It may be obtained in a sufficient state of purity by acting upon the crude tars and oils by concentrated sulphuric acid, or a mixture of sulphuric acid and niter, which removes the majority of the other ingredients; and on the distillation of the portion which resisted the action of the acid, the first part which passes over is the eupione. When pure, it has the composition C_6H_6, and is therefore a hydro-carbon. It is the lightest liquid known, having the density of 655 (water = 1000), and is thin, colorless, and tasteless, while it possesses a pleasant aromatic odor. It boils at 116° F., and distils readily;

whilst, when set fire to, it is very inflammable, burning with a white flame of considerable luminosity and penetrating power. It makes a greasy stain on paper, is insoluble in water, very slightly soluble in alcohol, but readily miscible with ethers and oils in general.

EU'PODA, a family of coleopterous insects of the tetramerous section of the order, deriving their name (Gr. well-footed) from the great size of the hinder thighs of many of the species. They feed on the stems and leaves of plants, some of them on aquatic plants, the roots of which afford food to their larvæ. The body is oblong; the antennæ filiform. Some of the E. are among the most splendid of tropical insects. Britain produces a number of small species.

EU'POLIS, b. 445 B.C.; an Athenian poet of the old comedy, ranking, in the opinion of Horace, with Cratinus and Aristophanes. It is said that he was thrown into the sea by Alcibiades, who had suffered from his sarcasm; but, according to another account, he fell in either the battle at Cynossema, 411 B.C., or that of Ægospotami, 408 B.C. He was sufficiently great to have a quarrel with Aristophanes on mutual charges of plagiarism.

EUPOMPUS, a Greek painter of the 4th c. B.C., contemporaneous with Zeuxis and Parrhassius. When the sculptor Lysippus asked him whom he should take for his model, Eupompus replied, "Take nature herself for your model, and be not shackled by the trammels of any predecessor."

EURA'SIAN, from Eur (Europe) and Asia; a half-breed, offspring of an Asiatic mother and European or American father. This class is very numerous in the large cities of India, and at the ports open to foreign commerce in Burmah, Siam, China, and Japan. In India, they number 100,000. In person, they are usually handsome, well-formed, and, as a rule, learn the language of their fathers; but are not well esteemed by either natives or foreigners. By the laws of Japan and of Great Britain, the sons are citizens with their fathers, the daughters with their mothers.

EURE, a river of the n.w. of France, and a tributary of the Seine, rises in the department of Orne, flows first s.e. into the center of the department of Eure-et-Loir, then n. and n.w. through the departments of Eure-et-Loir and Eure, and joins the Seine on the left above Pont-de-l'Arche, after a course of about 100 miles. Only that portion of the E. which is in the department of Eure is navigable.

EURE, a department in the n.w. of France, immediately s. of the department of Seine Inférieure, contains an area of 2,290 sq. miles. Pop. in '76, 373,629. Its surface is unusually level, as the highest eminences in the department are not more than 300 ft. in height. The principal river is the Seine, which entering the department from the s.e., flows through it in a n.w. direction to Pont-de-l'Arche, below which the course of this river is in the department of Seine Inférieure. The Eure, from which this department derives its name, and the Rille, both affluents to the Seine, are the only other important rivers. The climate is mild, moist, and foggy. Great part of the level country is covered with a loamy alluvial soil upon a stratum of limestone; while the remainder is composed of chalk, flint, and tufa. Along the Seine, the soil is in some parts sandy, stony, and barren, but the greater part is very fertile. The chief natural products are corn, hemp, flax, vegetables, and fruit, particularly apples and pears, from which large quantities of cider and perry are made. The breeding of cattle, horses, and sheep, is favored by extensive meadows and pasture-lands. Iron is found in considerable quantities. There are extensive iron and copper works and pin manufactories. Cotton goods, cloth, linen, paper, glass, and stoneware are likewise manufactured. The department of Eure is divided into five arrondissements—Evreux, Louviers, Les Andelys, Bernay, and Pont-Audemer. The capital is Evreux (q.v.).

EURE-ET-LOIR, a department of France, formed chiefly from the province of Orléannais, extends between lat. 47° 57′ and 48° 55′ n., and long. 0° 47′ and 2° east. Area, 4,260 sq. miles. Pop. '76, 283,075. It is watered mainly by the Eure in the n., and the Loir in the s., the two rivers from which it takes its name. This department lies on the water-shed between the bay of Biscay and the English channel. It is in general level, the e. and s. being occupied by high and extensive flats; while in the w. the scenery is finely varied by hill and valley. The soil is fertile, and, especially towards the e. and s., is admirably adapted for wheat. Hops grow spontaneously in some quarters. In the forests, the oak and birch are the prevailing trees. The rivers, none of which are navigable in this department, furnish valuable water-power for the numerous mills of various kinds that are situated on their banks. Iron is the only mineral found and worked to any great extent; but the chief articles of trade are corn, flour, and wool. The department is divided into the four arrondissements of Chartres, Château-Dun, Dreux, and Nogent-le-Rotrou, with the town of Chartres for capital.

EURE'KA (Gr.), "I have found it." An exclamation attributed to Archimedes, the famous philosopher of Syracuse. Hiero the king sent a quantity of gold to a jeweler to be made into a crown. He suspected that the man had taken some of the gold and supplied its place with alloy. Therefore he asked Archimedes to test the work and determine the truth. The philosopher was just then stepping into his bath, and as he did so the water overflowed. The fact struck his mind that the water was displaced in ratio with

the bulk of the object immersed, and suggested to his mind that, as a pound of gold was much smaller than a pound of silver, the trial of the crown in water would be a sure test. Convinced of the fact, he jumped from the bath, shouting "Heureka! Heureka!" and, without waiting to dress, ran home to prove the truth of his discovery.

EURIPIDĒS, the latest of the three great Greek tragedians, was b. at Salamis, 480 B.C., on the very day (23d Sept.), it is said, of the glorious victory gained by the Greeks over the Persians near that island. The Arundel Marble, however, gives as the date of his birth 485 B.C., while Müller, following Eratosthenes, makes it four years later. His education was very good. At first, he was trained to gymnastic exercises (in consequence of the prediction of an oracle that he should be crowned with "sacred garlands"); he next turned his attention to painting; then studied philosophy under Anaxagoras, and rhetoric under Prodicus, and formed a lasting friendship with Socrates. The first play of E.'s which was performed was the *Peliades* (456 B.C.). In 441 B.C., he gained the first prize for tragedy, and continued to write for the Athenian stage until 408 B.C., when he accepted an invitation to the court of Archelaus, king of Macedonia. Scandal has invented other reasons for E.'s leaving Athens, but they are unworthy of notice. He is said to have been killed (406 B.C.) by dogs, which were set upon him by two brother-poets who envied him his reputation. In E.'s time, Greek tragedy had been brought to its highest perfection by Sophocles, who was 15 years older than Euripides. The latter, however, was the second favorite author of his time; nay, on more than one occasion, his tragedies were preferred to those of Sophocles; but his liberal and even neologistic tendencies in regard to religion, excited the hostility of that witty but scurrilous champion of Greek orthodoxy, Aristophanes, who frequently ridiculed E. in cutting parodies. There can be no doubt that E. was systematically abused by the Athenian tory party, of whom Aristophanes was the literary chief, and to whose unscrupulous opposition it was owing that he gained the prize only five times out of 75 competitions. But against the censure of Aristophanes may be set the praise of two much greater men—Aristotle and John Milton. E.'s plays are reckoned by some to have amounted to 75, by others to 92. Only 18 have come down to us. These are *Alcestis* (438 B.C.), *Medea* (431 B.C.), *Hippolytus* (428 B.C.), *Hecuba* (424 B.C.), *Heracleidæ* (421 B.C. ?), *Supplices* (421 B.C. ?), *Ion* (date not ascertainable), *Hercules Furens* (date not ascertainable), *Andromache* (420–17 B.C.), *Troades* (415 B.C.), *Electra* (415–13 B.C.), *Helena* (412 B.C.), *Iphigeneia in Tauris* (date uncertain), *Orestes* (408 B.C.), *Phœnissæ* (probably same year), *Bacchæ* (probably written in Macedonia), *Iphigeneia in Aulis* (posthumously represented in Athens); and finally, *Cyclops* (uncertain). *Rhesus*, attributed to E., is probably not genuine. Concerning E. and his tragedies, A. W. Schlegel remarks: "Of few authors can so much good and evil be predicated with equal truth. He was a man of infinite talent, skilled in the most varied intellectual arts; but although abounding in brilliant and amiable qualities, he wanted the sublime earnestness and artistic skill which we admire in Æschylus and Sophocles. He aspires only to please, no matter by what means. For this reason, he is so frequently unequal to himself; producing at times passages of exquisite beauty, and frequently sinking into positive vulgarity." The main object of E. was to excite emotion, and his works laid open a totally new world (in literature), that of the heart, which, beyond dispute, contributed much to their popularity. On the other hand, his inartistic and careless plots compelling him to a constant use of the *Deus ex machinâ* solution of difficulties, and occasionally even the subjects of his art themselves, leave ample room for criticism. Archelaus refused to allow his bones to be removed to Athens, and erected a splendid monument to him in Pella, with the inscription: "Never, O Euripides, will thy memory be forgotten!" Still more honorable was the inscription on the cenotaph erected to him by the Athenians on the way to the Piræus: "All Greece is the monument of Euripides; Macedonian earth covers but his bones." Sophocles, who survived him, publicly lamented his loss; and the orator Lycurgus afterwards erected a statue to him in the theater at Athens. The *editio princeps of E.* appeared, it is thought, at Florence, toward the end of the 15th century. The best modern editions are those of Beck (Leip. 1778–88), Matthiae (Leip. 1813–29), Kirchhoff (1855), and Nauck (1871). An English translation in verse, by Potter, appeared at Oxford in 1814.

EURIPUS, the channel between the island of Eubœa and the coast of Greece. Opposite Chalcis it is but a little over 60 yards wide and 7 or 8 ft. deep. There is a rock in the channel, on which stands a castle connected with both shores by bridges. This double bridge is said to have been built originally as early as the 4th c. B.C.

EUROCLYDON, the name given to a wind which caught the ship in which Paul undertook his voyage to Rome. Biblical scholars are not entirely agreed as to the term and its meaning; but it is evident that it was a n.e. wind, or e.n.e., with variable and fierce gusts from various points—similar to our *northeasters*. It was probably one of those violent gales now called *levanters*.

EURO'PA, in Greek mythology, a daughter of Agenor or of Phœnix. Her beauty attracted the attention of Zeus, who appeared in the form of a white bull, and carried her to Crete, where she became the mother of Minos, Rhadamanthus, and Sarpedon. Her brother Cadmus, strictly charged not to return without her, set out with their mother (Telephassa) to find her. The mother died in Thessaly. At Delphi, Cadmus

learned that he must follow a cow, which would guide him to the place where he must build a city. The cow lay down on the site of Thebes; but before he could offer the animal as a sacrifice to Athene he had to fight with a dragon which haunted a well. He conquered the dragon, and sowed its teeth over the ground. From the teeth sprang armed men who slew each other until only five were left to become the progenitors of the Thebans. Athene made Cadmus king of Thebes, and Zeus gave him Harmonia as his bride. The fate of Europa is not further recorded, but her name still lives in the designation of the continent of Europe.

EUROPE, the smallest, but also the most highly civilized and most populous of the three great divisions of the old continent. It is separated from America on the w. and n.w. by the Atlantic; from Africa on the s. by the Mediterranean; and from Asia by the archipelago, sea of Marmora, Black sea, Caucasian ridge, Caspian sea, Ural river and mountains, and the Kara river. It is in the form of a huge peninsula, projecting from the n.w. of Asia. Its extent from cape St. Vincent on the s.w. to the mouth of the Kara river on the n.e. is 3,400 m.; and from cape Nordkun, the most northerly point of the Scandinavian mainland, to cape Matapan, the southmost point of Greece, 2,400 miles. The continent of E., irrespective of islands, lies within lat. 36° 1′ to 71° 6′ n., and long. 9° 30′ w. to 68° 30′ east. Its area is estimated at rather more than 3,720,000 sq.m.; and its coast-line, more extensive in proportion to its size than that of any other great natural division of the globe, is estimated at 19,500 m.; giving a proportion of 1 linear m. of coast for every 190 sq.m. of surface. It has a pop. of 299,000,000, which gives an average of about 80 for every sq. mile.

The body of the European continent divides itself naturally into two great portions —the great plain in the n.e., and the highlands in the s.w., the mountainous peninsula of Scandinavia, lying, as it were, apart from either, being to some extent exceptional. The plain occupies about two thirds (2,500,000 sq.m.) of the entire extent of the continent. It reaches from the eastern boundary of E., n. to the shores of the Arctic ocean, s. to mount Caucasus and the Black sea, and westward over the whole extent of the continent; gradually, however, becoming narrower in its progress west. In shape, this plain resembles a triangle; its base rests on the eastern boundary, and it may be said to reach its apex on the shores of Holland. It separates the two mountain systems of E.—the Scandinavian system (see SCANDINAVIA) on the n., and on the s. the system of southern Europe. See ALPS, APENNINES, BALKAN, CARPATHIAN MOUNTAINS, CEVENNES, PYRENEES, etc.

Jutting out in numerous peninsulas, and indented by extensive bays and gulfs, E. has no town at a much greater distance from the sea than 400 m., save those in the center of the eastern plain; but even here, by means of numberless rivers and the canals, which, from the nature of the country, are easily constructed and maintained, a splendid system of communication by water now exists. See VOLGA, DÜNA, DNIEPER, NIEMEN, etc. Also RUSSIA.

As the details of the geography of E. are given under the names of its several political divisions, and of its lakes, rivers, etc., little falls to be said under the present head. On the opposite page, however, is a table of the countries of E., with their extent, etc.

Geology.—The geology of E is most conveniently considered under the different countries. See also ALPS, PYRENEES, etc.

Natural History.—The natural history of E. very much agrees with that of the corresponding latitudes of Asia. The natural history of the European countries on the Mediterranean sea is very similar to that of Syria and of Asia Minor. The natural history of the more northern regions of E. resembles that of the great plains of Central Asia and Siberia. The most northern regions have the strictly arctic flora and fauna common in a great measure to all the arctic and subarctic regions; whilst the natural history of the most southern countries assumes a subtropical character. The European countries near the Mediterranean produce fewer of the shrubby and odoriferous *labiatæ* than the Caucasus and adjoining regions, whilst the *caryophyllaceæ* are more abundant. The extreme abundance of *cistaceæ* is a peculiar feature of the flora of Spain and Portugal. The *primulaceæ* are particularly plentiful in all the alpine regions of the s. of E., but this characteristic is in some measure shared by the Himalaya. In no other part of the world do umbelliferous and cruciferous plants plants form so large a proportion of the flora as in Europe.

The temperature of the western and northern parts of E. being raised by the gulf-stream and the winds from the great mass of dry and desert land in Africa above what is elsewhere found in similar latitudes, the flora and fauna exhibit a corresponding character, affected, however, by the great amount of moisture derived from the Atlantic ocean; and also to a still greater degree by the comparative uniformity of temperature which the proximity of the ocean produces. The effect of the last-mentioned causes is so great, that the northern limit of some plants is sooner reached on the shores of the Atlantic than in the more central parts of E., where the winters are much colder, and the average temperature of the year is lower. Of this the vine and maize are notable examples. Plants which require a mild winter will not grow in the n.—and scarcely even in the center of E.—but they advance along the western coast under the influence of the maritime climate. Thus the myrtle—although not indigenous—grows even in the

s. of England, Amongst plants, the date palm, and amongst animals a species of ape, are found in the s. of E. (the ape only on the rock of Gibraltar); whilst some strictly African birds are frequent visitants, and many birds—as the cuckoo, swallow, etc.—are common to E. and Africa, inhabitants in summer even of very northern regions, and returning in winter to the warm south.

*STATES.	FORM OF GOVERNMENT.	Ext. in Eng. sq.m.	Population.	No. inh. per Eng. sq.m.
Andorra	Republic, with a sovereign council	155	12,000	77
Austro-Hungarian Monarchy	Limited monarchy, two chambers	238,000	35,904,435	150
Belgium	Limited monarchy, two chambers	11,300	5,087,105	450
Britain, Great, and Ireland	Limited monarchy, two houses of parliament	121,600	31,857,398	261
Denmark	Limited monarchy, two chambers	14,500	1,822,402	125
France	Republic (1875), one chamber	201,000	36,102,921	179
German Empire	Limited monarchy, two chambers	(208,613	(41,060,695)	196
Prussia (with Lauenburg)	Limited monarchy, two chambers	134,281	24,656,078	183
Alsace-Lorraine	Crownland (Reichsland)	5,590	1,549,587	277
Anhalt	Duchy, limited sovereignty, one chamber	896	208,497	227
Baden	Grand duchy, limited sovereignty, two chambers	5,850	1,461,562	249
Bavaria	Limited monarchy, two chambers	29,280	4,852,026	165
Bremen	Free city, senate and burgher assembly	97	122,402	1,261
Brunswick	Duchy, limited sovereignty, one chamber	1,425	311,764	218
Hamburg	Free city, senate and burgher assembly	158	338,974	2,145
Hesse	Grand duchy, limited sovereignty, two chambers	2,962	852,894	287
Lippe-Detmold	Principality, limited sovereignty, one chamber	438	111,135	253
Lübeck	Free city, senate and burgher assembly	110	52,158	474
Mecklenburg-Schwerin	Grand duchy, limited sovereignty, one chamber	5,136	557,597	108
Mecklenburg-Strelitz	Grand duchy, limited sovereignty, one chamber	1,130	90,982	85
Oldenburg	Grand duchy, limited sovereignty, one chamber	2,470	312,556	126
Reuss-Greiz	Principality, limited sovereignty, one chamber	123	45,094	366
Reuss-Schleiz	Principality, limited sovereignty, one chamber	320	89,032	278
Saxe-Altenburg	Duchy, limited sovereignty, one chamber	510	142,122	278
Saxe-Coburg-Gotha	Duchy, limited sovereignty, one chamber for each duchy	760	174,339	229
Saxe-Meiningen	Duchy, limited sovereignty, one chamber	955	187,057	196
Saxe-Weimar	Grand duchy, limited sovereignty, one chamber	1,403	286,183	203
Saxony	Limited monarchy, two chambers	5,780	2,556,244	453
Schaumburg-Lippe	Principality, limited sovereignty, one chamber	170	32,059	188
Schwarzburg-Rudolstadt	Principality, limited sovereignty, one chamber	367	75,723	205
Schwarzburg-Sondershausen	Principality, limited sovereignty, one chamber	332	67,191	202
Waldeck	Principality, limited sovereignty, one chamber	493	56,224	128
Würtemberg	Limited monarchy, two chambers	7,532	1,818,539	241
Greece	Limited monarchy, one chamber	19,350	1,457,894	75
Italy	Limited monarchy, two chambers	112,890	26,716,809	236
Liechtenstein	Principality, one chamber	60	8,000	134
Monaco	Principality	5	3,127	625
Montenegro	Principality, limited sovereignty	1,080	130,000	77
Netherlands	Limited monarchy, two chambers	13,584	3,895,111	282
Portugal	Limited monarchy, two chambers	35,000	4,360,974	121
Russia (in Europe)	Absolute monarchy	2,059,000	71,105,344	34
Roumania (Wallachia and Moldavia)	Principality, two chambers	46,130	4,500,000	99
San Marino	Republic, sovereign council	21	7,303	347
Servia	Principality	16,810	1,319,293	77
Spain	Limited monarchy, two chambers (1875)	195,000	16,835,596	86
Sweden and Norway	Limited monarchy, two chambers for each country	288,600	5,950,775	20
Switzerland	Republican confederation, federal diet	15,800	2,669,147	169
Turkey (in Europe)	Absolute sovereignty	132,350	10,510,000	79
	Total	3,733,008	391,256,303	

* These statistics are necessarily founded on data obtained prior to the changes made in 1878 in the Balkan peninsula, and the constitution of the principality of Bulgaria (q.v.).

Of the plants now most commonly associated in our thoughts with the southern countries of E., many have probably been introduced from Africa, or from the east. This has probably been the case even with the myrtle, and certainly has been the case with the vine, the olive, the orange, lemon, etc., the fig, the peach, the almond, the apricot, etc. Some of the most extensively cultivated fruits are certainly indigenous to E., as the apple, pear, plum, and cherry, although even of these the first improved varieties may have been introduced from the earlier seats of civilization in the east. Among the wild animals of E. at the present day, the aurochs or bison is still reckoned; and the ox existed at no very remote period in a truly wild state. The reindeer

inhabits the extreme n. of E.; the elk, the stag, the fallow-deer, and the roebuck, are found in more southern nations; the ibex or bouquetin exists on the high central mountains; two species of antelope—the chamois of the Alps, and the saiga of the Russian plains—connect the European fauna with the Asiatic and African. Of carnivorous animals, the most worthy of notice are the bear, the wolf, the fox, and the lynx.

The abundance of lakes and streams in the northern parts of E. is accompanied with a corresponding abundance of water-fowl (*anatidæ*) and of fish. Of the latter, the *salmonidæ* are the most valuable, and the *cyprinidæ* next to them. The European seas afford valuable fisheries, particularly of herring and of cod in the n., and of tunny, anchovy, etc., in the Mediterranean.

The common hive bee and the Ligurian bee may probably be regarded as natives of Europe. The silk-worm was introduced from the east. Another valuable insect, the cochineal insect, was introduced from America; but the *cantharis*, or blistering fly, is truly indigenous to the s. of Europe.

EURO'TAS, a river of Greece now called the Vasiliko, rising in the Arcadian mountains and falling into the gulf of Laconia. The cities of Sparta and Amyclæ were on this river, which was one of the streams to which the ancient Greeks paid divine honors.

EURY'ALE, a genus of plants of the natural order *nymphæaceæ*, or water-lilies, closely allied to Victoria (q.v.), although of very different appearance. *E. ferox* is a water-lily with small red or violet-colored flowers, leaves about a foot in diameter, the leaf-stalks and calyces covered with stiff prickles; a native of India and China. The fruit is round, soft, pulpy, and of the size of a small orange, composed of a number of carpels, and containing round black seeds as large as peas, which are full of a nutritious agreeable farina, and are eaten roasted. The root-stock also contains starch, which may be separated and used for food; and the root itself is eaten. The plant is said to have been in cultivation in China for upwards of 3,000 years.

EURYD'ICE, the wife of Orpheus. She died from the sting of a serpent, and her husband followed her into hades, where he so charmed Pluto with the music of his lyre that he was permitted to take Eurydice back to earth on condition that while on his way he would not look behind him. Just as they were near the entrance Orpheus could no longer refrain from casting a backward glance, which showed him Eurydice rapidly receding to the regions of the dead.

EUSE'BIUS, of Cæsarea, the father of ecclesiastical history, was b. in Palestine, about 264 A.D. He took the surname of Pamphili from his friend Pamphilus, bishop of Cæsarea, whom he faithfully attended for the two years (307–309) in which he suffered imprisonment during the persecution of Diocletian. He then went to Tyre, and afterwards to Egypt, where he himself was thrown into prison on account of his religion. In 315, he succeeded Agapius as bishop of Cæsarea, took a prominent part at the council of Nice in 327, and died about 340.—E. was the head of the semi-Arian or moderate party in the council of Nice. That party were averse to discussing the nature of the Trinity, and would have preferred the simplicity of Scripture language in speaking about the Godhead to the metaphysical distinctions of either side. They regarded Trinitarianism, on the one hand, as logically indefensible, but, on the other, they recognized the fact, that Scripture sometimes spoke of the Son in terms not compatible with the views of Arius, and therefore they wished each man to enjoy the utmost freedom in his interpretation of Scripture on this point. E. thought that the great thing was to lay to heart the truth, that "God so loved the world that he gave his only begotten Son, that whosoever believeth on him should not perish, but have everlasting life." The promise is to him that *believeth on him*, not, he argues, to him that *knows how he is generated from the Father*. He was very reluctant to accept the term *homoousios* (of the same substance), devised by Athanasius to describe the equality of the Son with the Father, and retained the kindliest feelings towards Arius after the views of the latter were condemned. His moderation and other excellent qualities procured him the favor of Constantine, who declared that he was fit to be the bishop of almost the whole world. E. has the reputation of being the most learned Father of the church after Origen. His chief works are—1. The *Chronicon*, a history of the world down to the celebration of Constantine's *Vicennalia* at Nicomedeia and Rome, 327 and 328 A.D. It is valuable as containing extracts from such writers as Berosus, Sanchoniathon, Polyhistor, Cephalion, and Manetho. It was first published in a complete state by Mai and Zohrab, at Milan, in 1818, from an Armenian MS. version discovered at Constantinople. 2. The *Præparatio Evangelica*, in 15 books, a collection of such statements in old heathen authors as were fitted to make the mind regard the evidences of Christianity in a favorable light. It was translated into Latin, and appeared at Treviso in 1480. The Greek text was first published at Paris in 1544. 3. *Demonstratio Evangelica*, in 20 books, a work intended to convince the Jews of the truth of Christianity from the evidence of their own Scriptures. A Latin version of this was printed as early as 1498; the Greek original did not appear till 1544, when it was published along with the *Præparatio* at Paris, by R. Stephens. 4. The *Ecclesiastical History*, in 10 books. This relates the principal occurrences which took place in the Christian church till the year 324,

and contains the results of his studies in numerous libraries, and even in the imperial archives, the emperor Constantine having ordered, at E.'s request, an examination of all documents relative to the history of martyrs. One drawback of the work is that E., on principle, withholds all account of the wickedness and dissensions of Christians, inasmuch as he did not consider such stories for the edification of the church. A Latin translation of the work by Rufinus was published at Rome in 1474; the Greek text at Paris in 1549, and at Geneva in 1612. Among the more recent editions are those of Heinichen (Leib. 1827) and Burton (Oxford, 1838). The *Ecclesiastical History* has been translated into English, German, French, etc. Besides the foregoing works, may be mentioned the *De Martyribus Palestinæ*, a book against Hierocles; another against Marcellus; and a *Life of Constantine*. The first edition of all E.'s works appeared at Basel in 1542.

EUSE'BIUS, of Emisa, was b. at Edessa, studied at Alexandria, and was the pupil of Eusebius Pamphili, and the friend of Eusebius of Nicomedeia. Averse to all theological controversies, he declined the bishopric of Alexandria, vacant by the deposition of Athanasius. He was afterwards, however, appointed bishop of Emisa, but during his ordination, a Christian mob, accusing him of "mathematics" and magic, created a tumult, and obliged him to flee for his life. Subsequently, he returned to Emisa, where he was "tolerated" in spite of his dangerous knowledge. He died at Antioch in 360. The emperor Constantius was much attached to E., and used to take him with him on his military expeditions. E. was accused of Sabellianism (q.v.), and Jerome calls him "the ringleader of the Arian party." Jerome, however, was rash in his epithets, and it is more probable that he belonged to the party of his namesake of Cæsarea, the semi-Arians, or peace-party, who wished the doctrine of the Godhead expressed in the language of Scripture, and not of theology. The homilies extant under his name have been published by Augusti (Elberf. 1829). The genuine ones display great eloquence. Other writings by him, as, for example, the *Quæstiones XX. Evangelicæ*, and part of the *Commentarius in Lucam*, were published by Mai, in the *Scriptorum Veterum Nova Collectio* (vol. i., Rome, 1825). See Thilo, *Ueber die Schriften des E. von Emisa* (Halle, 1832).

EUSE'BIUS, of Nicomedia, Patriarch of Constantinople, b. towards the end of the 3d c., was first tutor to the emperor Julian, to whom he was related by the mother's side; then bishop of Beryta (Beyrout), in Syria, and afterwards of Nicomedia. In order to secure his position, he appeared as the defender of Arius at the council of Nice, and afterwards placed himself at the head of the Arian party. Under the emperor Constantine, whom he baptized in 337, he became patriarch of Constantinople. He died in the year 342, after having, in the previous year, held an assembly of the church for the establishment of Arianism at Antioch. It is not easy to get at his real character. We have no ecclesiastical works by Arian writers, our only sources of information as regards the character and opinions of that party being their enemies—the orthodox party; yet, making the ordinary allowance for partisanship, there would seem to be sufficient reason for concluding that E. was cunning and double-tongued when occasion required, and imperious and violent when he had power in his hands. Athanasius considered him not the disciple, but rather the teacher of Arius. From him the Arians are sometimes styled Eusebians. See Neander, *Kirchengeschichte*, vol. ii. p. 773, etc.

EUSTACHIAN TUBE. See EAR.

EUSTACHIAN VALVE. See FŒTUS.

EUSTACH'IUS, BARTOLOMMEO, an Italian anatomist, who was b. in the early part of the 16th c., and died in 1574. Few particulars are known regarding his life, but we learn from the introduction to one of his works, that in 1562 he was professor of medicine in the Collegio della Sapienza at Rome. His name is indelibly associated with anatomical science, through his discoveries of the tube in the auditory apparatus, and the valvular structure in the heart, which have been called after him. He was the first to give an accurate description of the thoracic duct, and was probably the first to notice and describe the stapes (one of the chain of small bones crossing the tympanic cavity of the ear), a discovery which, however, Fallopius assigns to Ingrassias. He likewise contributed materially to the diffusion of more accurate knowledge regarding the development and evolution of the teeth, and the structure of the kidney. These discoveries are recorded in his *Opuscula Anatomica*, published at Venice in 1563. He was the first anatomical writer who illustrated his works with good engravings on copper. The *Tabulæ Anatomicæ*, which he was probably unable to publish in consequence of the poverty of which he complains in the introduction to which we have already referred, did not appear until 1714, when they were edited, with explanatory remarks, by Lancisi. Their value is sufficiently evidenced by the fact, that Albinus published a new edition, with an excellent Latin commentary, in 1743, at Leyden; that Bonn published a Dutch edition in 1798 at Amsterdam; and that a German edition appeared in 1800. Lauth, in his *History of Anatomical Discovery*, remarks that if the *Tabulæ* had appeared in E.'s lifetime, anatomy would have attained the perfection of the 18th c. nearly 200 years earlier. E., Vesalius, and Fallopius may be regarded as the three great founders of modern anatomy.

EUSTA'THIUS, the celebrated Greek commentator on Homer and the geographer Dionysius, was born at Constantinople. He was at first a monk, then a deacon and teacher of rhetoric in his native city, and, in the year 1155, was appointed archbishop of Thessalonica, where he died in 1198. E. was profoundly versed in the ancient classic authors, and a man of prodigious acquirements, as is proved by his commentaries. The number of authors whom he quotes is almost incredible, and the value of his quotations is heightened by the consideration, that most of the works from which he extracts are no longer extant. His most important work is his *Commentary on the Iliad and Odyssey of Homer.* The first edition appeared at Rome 1542–50; the last at Leip. 1825–29. The work is open to objection on the score of method, and is diffuse and digressive, but it is nevertheless a vast mine of knowledge for students of Homer. Of a similar character is E.'s *Commentary on Dionysius,* first printed by Stephens (Paris, 1547), and lastly in Bernhardy's edition of Dionysius (Leip. 1828). Of his commentary on the hymns of Pindar, only the *Proœmium* has come down to us. It was first published by Tafel in 1832, along with E.'s theological treatises and letters.

EUSTA'THIUS, SAINT, a native of Pamphylia; bishop of Berœa, and in 325 A.D. patriarch of Antioch. He was a zealous opponent of the Arians, who contrived to have him deposed on charges of heresy and unfaithfulness to the vows of celibacy. He was banished to Thrace, where he died about 360 A.D.

EUSTA'TIUS, ST., one of the Dutch West India islands, lies near the n.e. bend of the great arch of the Antilles, about 12 m. to the n.w. of St. Christopher. Lat. 17° 31′ n., and long. 63° 5′ west. Area, 8 sq. miles. St. E. is a pyramidal rock, of volcanic formation, showing two extinct craters, and being still subject to earthquakes. Hurricanes also of intense severity occur, more particularly in Aug. and Sept. Along its entire circuit of 29 m., St. E. has only one landing-place, which, besides being difficult of access, is strongly fortified. The whole mountain is fertile, producing in abundance not merely commercial crops, such as sugar, cotton, and tobacco, but also provisions of various kinds, such as maize, hogs, goats, and poultry. Pop. about 2,000.

EUSTIS, WILLIAM, LL.D., 1753–1825; b. Mass.; a graduate of Harvard; studied medicine under Dr. Joseph Warren; served as a surgeon in the revolutionary army, and in the hospitals. He was a member of the state legislature, a member of the council; twice a member of congress; secretary of war 1809–12; minister to Holland 1814; governor of Massachusetts in 1824, and died while in office.

EUTAW SPRINGS, BATTLE OF, Sept. 8, 1781; between the American revolutionists under gen. Greene, and the British under col. Stuart. The British retreated, losing about 630 men; the American loss was 535. The scene of the battle was about 60 m. n.w. of Charleston, S. C.

EUTER'PE, a genus of palms, having male and female flowers intermingled on the same spadix, the spadices springing from beneath the leaves; the spathe entire, membranaceous, and deciduous. They are very elegant palms; with lofty, slender, smooth, faintly ringed stems; and pinnate leaves, forming a graceful feathery plume; the bases of the leaf-stalks sheathing far down the stem, and so forming a thick column of several feet in length at its summit. To this genus the cabbage palm of the West Indies, and the Assai palm of the banks of the Amazon, are often referred. See ARECA and ASSAI.

EUTER'PE (i.e., she who delights), one of the nine muses, was the daughter of Zeus and Mnemosyne. She was the muse of lyric poetry, and is represented in ancient works of art with a flute in her hand. See MUSES.

EUTRO'PIUS, a Latin historian, concerning whom we only know that he filled the office of secretary to the emperor Constantine, fought against the Persians under Julian, and was still alive in the reign of Valens. The period of his death is unknown. His *Breviarum Historiæ Romanæ,* giving a short narrative of Roman history from the foundation of the city to the time of the emperor Valens, is written in an extremely simple and pure style, and appears to have been originally intended for the use of schools. It became very popular as the taste for original investigation declined, in that dark period between the death of the old world and the birth of the new; and is either copied or followed by the early monkish annalists. An edition, with enlargements, however, was published by Paul, son of Warnefrid ud Theodolinda, generally known as Paulus Diaconus. Others continued it down to the year 813. The history existed in three distinct forms at the revival of letters: there was first the genuine work of E. in ten books; second, the expanded editions of Paul; and third, a very complete, but also largely interpolated copy contained in the *Historia Miscella.* The *editio princeps,* printed at Rome in 1471, was from the impure text of Paul. The best editions in modern times are those of Tzschucke (Leip. 1796, improved 1804), and of Grosse (Halle, 1813; Leip. 1825).

EU'TYCHES, a Byzantine ecclesiastic of the 5th c., and a zealous but unskillful representative of the dogmatic opinions of Cyril of Alexandria. In opposing the doctrines of Nestorius, he fell into the opposite extreme, and taught that after the union of the two natures in Jesus Christ, the human nature was absorbed in the divine; an opinion which spread extensively through the Alexandrian church. E. was in consequence summoned before a synod at Constantinople in the year 448, and deposed by Flavianus,

patriarch of that city; but his cause was warmly espoused by the eunuch Chrysaphius, chief minister of the emperor Theodosius II., and Dioscurus, bishop of Alexandria, who were both opposed to Flavianus. Chrysaphius induced the emperor to call a general council at Ephesus in the following year, under the presidency of Dioscurus. Measures were taken beforehand to secure a triumph over the anti-Eutychians. Soldiers were admitted to the deliberations of the council, to overawe the party of Flavianus; while a crowd of fierce Egyptian monks, devotedly attached to whatever was popular in Alexandria, or had been countenanced by their old pupil Cyril, drowned by their fanatical outcries the voices of those who ventured to speak against Eutyches. The result was that the judgment of the previous council was reversed; Flavianus and his adherents were deposed, and the doctrine of E. affirmed to be orthodox, and in accordance with the Nicene creed. His triumph, however, lasted only two years; in 451, Eutychianism was pronounced heresy at the council of Chalcedon, attended by 650 bishops; and in opposition to his views, it was declared that in Christ the two natures were united without confusion or conversion of substance. Nothing further is known concerning E., except that Leo wrote to the emperor Marcian to banish him from the capital. The sect of Eutychians, however, under the name of Monophysites, continued to exist quietly for a century after his death, in the Armenian, Ethiopian, and Coptic churches, when it awoke to new life under the auspices of Jacob Baradæus, who died bishop of Edessa, 588 A.D. His followers were called Jacobites, and have perpetuated the Monophysite doctrine in the Armenian and Coptic churches to the present day. See Neander, *Kirchengeschichte*, vol. iii., p. 1079, etc.

EUX'INE (Gr. *euxinos*, hospitable) is the name applied by the ancients to the Black sea (q.v.). Before receiving this name it was called *Axenos Pontos*, the inhospitable sea, because of the black and turbulent weather so frequently ascribed to it by the ancient poets, and the reported cannibalism of the Scythian tribes who lined its northern shores. It seems to have been called the *Euxine*, or hospitable sea, after the establishment of Greek colonies on its borders, and when its waters were thrown open to Greek commerce.

EUYUK, or UYÜK, a Turkish village in Asia Minor, 75 m. w.s.w. of Amasia. It has but about 20 houses, but is important as containing some of the most remarkable ruins in the east. They are the remains of a large building, and consist of colossal blocks of granite containing a great variety of sculptures very little defaced. The upper portion of the wall seems to have been formed of clay, as there are no remains of overturned materials. In form the building resembles an Assyrian palace, and has been conjectured by some to have been erected by the builders of the palaces of Nineveh, adopting in this instance, as they are known to have done in others, Egyptian figures and emblems. But not merely from the sphinxes, but also from the character of the human figures, Van Lennep considers that it was more probably a temple erected by Egyptians, who adopted an Assyrian form of building; and he conjectures that it dates back to the earliest Egytian conquests in Asia Minor.

EVAG'ORAS, King of Salamis, 410 B.C. Isocrates says he was a just and wise ruler, who promoted the welfare of his people. He cultivated the friendship of the Athenians, and after Conon's defeat at Ægospotami gave that officer a refuge. He made friends of the Persians, and assisted them and the Athenians in gaining the victory of Cnidus, 394 B.C. In 387, he was at war with the Persians, but soon made peace. He was assassinated 374 B.C.

EVA'GRIUS, b. Syria, 536 A.D. He was an advocate at Antioch, and the legal advisor of Gregory, the patriarch. The emperor Tiberius made him a quæstor, and his influence and reputation were such that on the occasion of his second marriage he was given a public festival, which, however, was interrupted by an earthquake, in which 60,000 persons are said to have perished. He was the author of a valuable *Ecclesiastical History*.

EVAN'DER, a semi-mythical Grecian hero of antiquity, was, according to Roman traditions, the son of Hermes, by Carmenta or Tiburtis. About 60 years before the Trojan war, he is said to have led a Pelasgian colony from Pallantium, in Arcadia, to Italy, and to have landed on the banks of the Tiber, and near the foot of the Palatine hill. Here he built a town, naming it Pallantium, after the one in Arcadia. At a later period it was incorporated with Rome, and is affirmed to have originated the names Palatinus and Palatium. Tradition represented E. as having done much to introduce the habits of social life among his neighbors; he prescribed for them milder laws, and taught them, among other arts, those of music and writing. To him is also ascribed the introduction of the worship of the Lycæan Pan, with that of Demeter, Poseidon, and other deities. Virgil represents him as being still alive when Æneas arrived in Latium after the sack of Troy. E. was worshiped both at Pallantium, in Arcadia, and at Rome.

EVANGELICAL is an adjective derived from the Gr. *euangelion*, "good news," or "the gospel," and is applied in general to anything which is marked by the spirit of the gospel of Jesus Christ. Thus, we speak of an E. sermon, of E. piety, E. views, etc., though it is but right to mention that the term "E." in such a connection is used

by a portion of the religious community to denote, not so much a spirit or sentiment resembling that of the Saviour, but certain peculiar theological opinions, which are held to constitute the only true and complete expression of Christian belief. In England and Scotland, dissenters have generally laid claim to be considered more "E." than the national churches—i.e., they conceive that they have borne, and still bear, more decided testimony than their brethren of the establishment to the truth of such doctrines as the total depravity of human nature, the imputation of Adam's sin to his posterity, the expiatory character of Christ's sufferings, justification by faith in the atoning efficacy of these sufferings, etc. In the Anglican church, however, the rise of the Puseyite or Tractarian party has brought into prominence an antagonistic party, resembling dissenters very much in their theological tenets. This party calls itself, *par excellence*, "evangelical."—In Germany, all Protestants call themselves E., in opposition to Catholics, on the ground that the reformers taught the pure gospel of the grace of God in Christ, cleansing it of all human corruptions. The modern orthodox or pietistic party in the German Protestant churches have of late made exclusive claim to the attribute E., on the ground that they alone hold to the gospel in its actual historical shape. This claim is naturally disputed by the liberal theologians.

EVANGELICAL ALLIANCE, an association of "evangelical Christians belonging to various churches and countries," formed in 1845, "to associate and concentrate the strength of an enlightened Protestantism against the encroachments of popery and Puseyism, and to promote the interests of a Scriptural Christianity." Its origin is to be ascribed to a deep sense of the evil of the divisions existing among Protestants, who nevertheless agree in holding the essential principles of the reformation. A number of circumstances concurred to direct the attention of Christians both in England and Scotland very strongly to this subject; and a requisition, signed by ministers and others belonging to various denominations in Scotland, was addressed to "the evangelical churches of England, Wales, and Ireland," convening a meeting to be held at Liverpool in Oct., 1845. To this requisition a cordial response was given; the meeting was numerously attended by persons of great influence, both in the established and dissenting churches; great harmony prevailed; and the E. A. was then organized. It now has branches in the most important cities and towns of Britain, and of many other parts of world; it has contributed to the promotion of Christian union, fellowship, and brotherly co-operation, and at least as evidently on the continent of Europe as in Britain; affording at the same time much encouragement to those who in various countries of the continent were struggling in the feebleness of isolation against all the forms of opinion most adverse to the principles of the reformation, but to whose support the strength of British Protestantism has been in some measure brought. The E. A. seeks, by various means, to promote the cause of "evangelical Protestantism," and to oppose "infidelity, popery, and other forms of superstition, error, and profaneness, especially the profanation of the Lord's day." It has also ventured to remonstrate, and with some effect, against the persecution still practiced in some Protestant countries of the n. of Europe both against Protestant dissenters and Roman Catholics, and thus has sought to extend the influence of the principles of toleration. The meetings which have been held under its auspices in continental cities have also led to much temperate and friendly discussion on various important questions. Great meetings of the E. A. were held at Paris in 1855, at Berlin in 1857, and Geneva in 1861, and at New York in 1873. At the Paris exhibition of 1867, the E. A., with the sanction of the French government, erected the *Salle Evangelique*, where meetings for divine worship and united prayer were held daily.

The E. A. adopted as its basis a brief statement of the points of doctrine on which its members must hold "what are usually understood to be evangelical views." This gave rise to objections against it on the part of some who would gladly have joined it, but for an apprehension of compromising principles to which they did not think due place was given.

Its basis excludes those who, although otherwise holding evangelical doctrines, deny "the divine institution of the Christian ministry, and the authority and perpetuity of the ordinances of baptism and the Lord's supper." The transactions of the alliance are reported in a monthly periodical, issued under its auspices, entitled, *Evangelical Christendom*.

EVANGELICAL ALLIANCE (*ante*). This voluntary association of Christians belonging to various denominations and countries, had its origin in a general and strong desire for a more practical union among Protestants in order to promote the cultivation of Christian fellowship and the extension of Christian faith. After full conference and correspondence the alliance was formed in Freemason's hall, London, Aug. 19–23, 1846, at a meeting, of about 800 persons, Episcopalians, Presbyterians, Independents, Methodists, Baptists, Lutherans, Reformed, Moravians, and others. Among these were many distinguished ministers and philanthropists from Great Britain, Germany, France, Switzerland, and the United States. The following doctrinal articles were adopted, not as a binding creed, but simply as an expression of the points of faith considered essential among those who are embraced in the alliance. 1. The divine inspiration, authority, and sufficiency of the Holy Scriptures. 2. The right and duty of private judgment in

the interpretation of the Holy Scriptures. 3. The unity of the Godhead and the Trinity of the persons therein. 4. The utter depravity of human nature in consequence of the fall. 5. The incarnation of the Son of God, his work of atonement for the sins of mankind, and his mediatorial intercession and reign. 6. The justification of the sinner by faith alone. 7. The work of the Holy Spirit in conversion and sanctification. 8. The immortality of the soul, the resurrection of the body, the judgment of the world by our Lord Jesus Christ, with the eternal blessedness of the righteous and the eternal punishment of the wicked. 9. The divine institution of the Christian ministry and the obligation and perpetuity of the ordinances of baptism and the Lord's supper. The organization thus happily commenced has since been extended throughout Protestant Christendom. Branch alliances have been formed in Great Britain, Germany, France, Switzerland, Sweden, the United States, Australia, and among the missionaries in Turkey, India, Brazil, and Japan. These national branches are related to each other as members of a confederation having equal rights. The whole alliance appears in active operation only when it meets in general conferences having the character of Protestant ecumenical councils, but claiming only moral and spiritual power. These have already been held at London, 1851; Paris, 1855; Berlin, 1857; Geneva, 1861; Amsterdam, 1867; New York, 1873; Basle, 1878. The most enthusiastic and effective of these was the one at New York, when, for the first time, Christians from all parts of the earth met together in the new world to take counsel concerning the condition of Christendom, Christian union, Christian life, Christianity and unbelief, Christianity and error, Christianity and civil government, Christian philanthropy, and reform of social evils. The visible results of the E. A. may be seen, in part, in its promotion of religious liberty wherever that has been restricted or assailed. Since its organization several cases of persecution have occurred in southern Europe under the operation of penal laws against Protestants. In these cases the influence of the alliance has been successfully exerted to bring the persecution to an end. It has aided in bringing about the remarkable changes in favor of religious liberty which have taken place in Turkey within the last quarter of a century. It interceded for the Methodists and Baptists in Sweden, and that country has since abrogated its penal laws against dissenters. It sent a delegation in 1871 to the czar of Russia to plead for the Lutherans in the Baltic provinces, and since that time they have not been oppressed. It remonstrated against the persecution of Roman Catholic and other Christians in Japan, and the persecution has not been renewed. These instances are sufficient to show that the power of Christian public sentiment, as expressed by the alliance, already commands a respectful hearing everywhere, and must, ultimately, be universally obeyed.

EVANGELICAL ASSOCIATION, a religious body which was organized in 1803 among Germans in the United States of North America, and has considerably extended itself both in that country and in Canada, being no longer chiefly confined, as it was at first, to German immigrants and their descendants using the German language. Its doctrines are a modified Calvinism; its church government a modified episcopacy.

EVANGELICAL ASSOCIATION (*ante*), called sometimes, incorrectly, the German Methodist church, is a sect of American Christians, originally of German descent, formed under the influence of the Rev. Jacob Albright, who, looking with regret on certain doctrines and habits prevalent among the German churches of eastern Pennsylvania, endeavored to reform them. A meeting of his converts in 1800 chose him as their pastor or bishop, and gave him jurisdiction as such over the members of the association. Subsequently annual conferences were established, and in 1816 a general conference, consisting of all the elders, met in Union county, Penn. Since 1843, general conferences, consisting of delegates from the annual conferences, have been held every four years. During its earlier years the E. A. was violently opposed, but for the last half century it has been quiet and prosperous. As it denounced slavery it made no progress in the southern states, but it has spread over the n., into Canada and even Germany. In theological doctrine it is described as endeavoring to blend Calvinistic and Arminian views; in polity, worship, and plans of work it resembles the Methodist Episcopal church; the ministers are divided into elders and deacons; the bishops (elected by the general conference) and the presiding elders (elected by the annual conference) continue in office four years, and may be re-elected. At first, preaching and other public services were conducted almost exclusively in the German language; now, however, the English also is employed. The denomination has a flourishing college at Plainfield, Ill. In 1878, it reported 19 annual conferences, 1400 preachers (itinerant and local), 1422 houses of worship, 401 parsonages, 108,000 church-members, 1846 Sunday-schools with 132,625 teachers and scholars, $85,400 contributed to missions and other departments of benevolent work.

EVANGELICAL CHURCH CONFERENCE is the name given to periodical meetings of the Protestant churches of the German states, the holding of which was suggested by king William of Würtemberg in 1815. The first was held at Berlin in 1846 and included representatives from nearly all the German states. At the second, held at Eisenach in 1852, a central organ was established at Stuttgart. From 1855 to 1868, the conferences were held at Eisenach.

EVANGELICAL COUNSELS are given by the Roman Catholic church when it recommends certain things to any one who is willing to practice them, not as in themselves obligatory, but as conducive to the attainment of superior holiness. Among them the principal are celibacy, poverty, and submission to monastic rules. Some writers include under this title various Scripture directions, such as "Resist not evil;" "If any man will sue thee at the law and take away thy coat, let him have thy cloak also;" "Whosoever shall compel thee to go a mile, go with him twain."

EVANGELICAL UNION, the name assumed by a religious body constituted in Scotland in 1843 by the Rev. James Morison of Kilmarnock (now Dr. Morison of Glasgow), and other three ministers (with their respective adherents), who had been separated from the United Secession church for doctrinal views, of which the fundamental and determining article was the strict universality of the Saviour's atonement. Coeval with the body is its theological academy, presided over by Dr. Morison, and attended by over twenty student annually. They were soon joined by a number of ministers and churches of the Congregational union of Scotland, and have since extended themselves considerably in Scotland and the n. of England. Their church government is independent, but many congregations have ruling elders. Their doctrinal views are exhibited in an authorized publication, entitled *Doctrinal Declaration*, issued in Sept., 1858. See MORISONIANISM.

EVANGELIST, literally, a bringer of good tidings. It designates, in the New Testament, a person appointed by an apostle to itinerate among the heathen, and so prepare the way for resident instructors. The evangelist, therefore, had no particular flock assigned to him, and is to be distinguished both from bishops and ordinary pastors. Later in the history of the early church, the evangelist figures, according to Eusebius, as "a deliverer of the written gospels to those who were ignorant of the faith." This may possibly imply that he acted as a colporteur, by distributing copies of the gospels, or that he read them to the heathen, and so made them familiar with their contents.—The word evangelist is also used to denote the four writers of the life and gospel of Jesus Christ, these being evangelists ("bringers of good tidings") *par excellence*.

EVANGELISTS, SYMBOLS OF THE FOUR. For Matthew: a man holding a pen and scroll, looking over his left shoulder at an angel: Matthew's was the first gospel, and the angel represents the dictator of it. For Mark: a man writing, and at his side a winged lion couchant, emblematical of the resurrection which is most fully described by this evangelist. For Luke; a man with a pen looking over a scroll, and near by an ox or cow chewing the cud; the latter figure refers to the eclectic character of the third gospel. For John; a young man of delicate appearance, with an eagle in the background to denote sublimity. The more ancient symbols were: for Matthew, a man's face; for Mark, a lion; for Luke, an ox; for John, a flying eagle: all alluding to the four cherubim before the throne of God, described in the *Revelation*.

EVANS, Lieutenant-general Sir DE LACY, G.C.B., b. at Moig, in Ireland, 1787; entered the army as ensign in 1807; in 1812, joined the 3d light dragoons, with whom he saw much peninsular service. In 1814, he was present as brevet lieut.col. of an infantry regiment at the capture of Washington, the attack on Baltimore, and the operations before New Orleans. He was next at Waterloo. In 1830-31, he sat for Rye, and in 1833 was elected on the liberal interest for Westminster, which he represented until 1841. The cause of the young queen of Spain was believed by the English ministry to be identified with that of freedom and constitutional government, and an order in council was issued in 1835, authorizing the raising of 10,000 men for service in Spain, and expressing the king's desire that his subjects should take part with the queen of Spain, his ally, by entering the new corps. The command of the British auxiliary legion was offered to E., and he was allowed by his constituents to accept it without vacating his seat for Westminster. E.'s principal military exploits at the head of the British legion were the storm and capture of the Carlist lines of Ayetta, near St. Sebastian, in 1836; the storm and capture of Irun; and the capture of Oyarzun and Fontarabia. For these services, he received the grand crosses of St. Ferdinand and Charles III. At the general election for 1841, E. was defeated for Westminster, but was re-elected in 1846, and continued to hold his seat, by undisputed tenure, till 1865. He was promoted to the rank of maj.gen. of the British army in 1846, and obtained the colonelcy of the 21st foot in 1853. On the declaration of war against Russia, he was appointed to command the second division of the army sent out to the Crimea, with the rank of lieut.gen. His division was hotly engaged in the battle of the Alma, and E. received a severe contusion of the shoulder. On the 26th Oct., during the siege of Sebastopol, his division was attacked by a force of 6,000 Russians. E. met the enemy with great gallantry, and drove them back into the town. In Feb., 1855, E. attended in his place, and received the public thanks of the house of commons, through the speaker, for his services in the Crimea. He was rewarded by the crown with the grand cross of the bath, and by the emperor of the French with the grand cordon of the legion of honor. He also received the degree of D.C.L. from the university of Oxford. He took a frequent part in debates on matters of army administration. In politics, he always belonged to the party of "advanced liberals." He died Jan. 9, 1870.

EVANS, FREDERICK WILLIAM, b. England, 1808; came to the United States in 1820; returned to England, and became interested in Owen's theories and joined the Shakers. Returning to America, he soon became a leader of the Shakers in this country, residing at New Lebanon, N. Y. He has published a number of works on the history and doctrines of that peculiar people. As a leader he has excellent faculty; as a writer his earnestness and a certain sharpness of style mark him as the chief polemic of his sect.

EVANS, Miss MARIAN, known under the *nom de plume* of "George Eliot," was b. in Warwickshire about the year 1820. Before she became known as the author of the remarkable series of fictions with which her name is popularly associated, she had already acquired reputation in the literary circles of the metropolis as a writer of distinguished ability. She contributed largely to the *Westminster Review*, of which she was at one time editor; and translated the famous *Leben Jesu* of the late Dr. Strauss, her English version of which was published in 1846; and also Feuerbach's *Essence of Christianity*. During 1857, there appeared in *Blackwood's Magazine*, with the signature of George Eliot, a series of stories under the title of *Scenes of Clerical Life*, the very unusual merit of which instantly attracted attention. They seemed to proclaim with great distinctness the advent of a new novelist of fresh and original power. It was from the first sufficiently well understood that the signature was a mere *nom de plume;* and no little curiosity was excited as to the personality of the author unknown. This feeling was much deepened by the publication in 1858, by the Messrs. Blackwood, of the novel of *Adam Bede*, which attained an immense success, and at once secured for the writer almost undisputed rank with the most eminent novelists of the day. This was followed, in 1859, by *The Mill on the Floss*, which amply sustained the reputation of the writer; and in 1861 by *Silas Marner, the Weaver of Raveloe*, a tale in one volume, which, as to art, is perhaps the most perfect of any of this series of works. In 1861, the *Scenes of Clerical Life* were republished from *Blackwood's Magazine*, to meet with a renewal of the favor with which they were originally received; and in 1863, *Romola*, an elaborate historical novel of Italian life, was published by Messrs. Smith, Elder & Co., in whose *Cornhill Magazine* it had previously from month to month appeared. This work has never had quite the popularity of its predecessors, but is considered by a selecter circle of readers—and perhaps on the whole with justice—the greatest intellectual effort of the author. Meantime—though the avowal has never in any formal fashion been made—it had by degrees become positively certain that Miss E. was the "George Eliot" of these works; and by not a few competent critics a place had been frankly assigned her at the very summit of this branch of our literature. *Felix Holt, the Radical*, published in 1866 by Messrs. Blackwood, was distinctly *the* book of the season, and was almost everywhere received with acclamation. *Middlemarch, a Study of English Provincial Life*, began to be published in divisions by Messrs. Blackwood in 1871. It was completed in 8 divisions, the last of which was issued in 1872, and simultaneous with it the entire work appeared in 4 vols. The divisions had an enormous circulation, and enhanced Miss E.'s great reputation. *Daniel Deronda* was published in the same way in 1876. Miss E. has also published poetry of a high degree of merit. *The Spanish Gypsy* was published by Messrs. Blackwood in 1868; in 1869 appeared *Agatha, a poem;* in 1870, *The Legend of Jubal*, a poem of great power; and in 1871, *Armgart, a dramatic poem.* In 1879 appeared a volume of essays, *The Impressions of Theophrastus Such*, which in a month or two reached a fourth edition.

EVANS, MARIAN (*ante*), was the daughter of a poor clergyman, but in early life was adopted by a wealthy clergyman, who gave her a first-class education. When she left school, while she was still very young, Mr. Herbert Spencer became her tutor and friend, and, under his training, her mind was developed rapidly and broadly. She applied herself to languages, mastering German, French, and Italian; became an accomplished musician; and familiarized herself not only with the fine arts, but also with metaphysics and logic. While in this stage she translated Strauss's *Life of Jesus;* and soon afterwards became one of the staff of the *Westminster Review*. Here, by her intimacy with Mr. John Stuart Mill and others, she became confirmed in their peculiar religious and philosophical views. She was known as the wife of George Henry Lewes (q. v.), who d. 1878. Early in May, 1880, she married John Walter Cross, a rich English merchant, 10 or 15 years her junior.

EVANS, OLIVER, 1755–1819; b. Del. He was apprenticed to a wheelwright, but soon displayed uncommon inventive genius. When 22 years old he invented a machine for making card-teeth which superseded hand work. He made the first high-pressure steam-engine and the first steam dredging machine used in this country. This machine was put on wheels and propelled itself to the Schuylkill river, 1½ m.; was fitted with a steam paddle-wheel and navigated the Schuylkill down to its junction with the Delaware. This is supposed to have been the first actual propulsion of a carriage on land by steam in America. He urged the construction of railroads with rails of wood or iron, but was hindered by limited means from carrying out the idea to any practical result.

EVANSTON, a village in Cook co., Ill., on lake Michigan, 12 m. n. of Chicago; reached by the Milwaukee division of the Chicago and Northwestern railroad; pop. of township, '70, 3,062; in '80, 6,703. Evanston is the seat of Northwestern (Methodist)

university, the Evanston college for women, and the Garrett biblical institute. It has a beautiful situation, many fine buildings, and social attractions of a high order.

EVANSVILLE, a flourishing city of Indiana, in the United States, stands on the right bank of the Ohio, about 150 m. s.w. of Indianapolis. It is very advantageously situated for trade. From E. downwards, the navigation is seldom interrupted either by drought or by ice; and here terminates the Wabash and Erie canal, the longest work of the kind in the American republic. Thus, the place connects the lower Ohio at once with the inland lakes and with the gulf of Mexico. Coal and iron ore abound in the vicinity. Pop. '70, 21,830.

EVANSVILLE (*ante*), a port of entry and city in Vanderburg co., Ind., on the Ohio river, midway between Louisville and Cairo; on the St. Louis and Southeastern, the Evansville and Terre Haute, and the Lake Erie, Evansville, and Southwestern railroads; pop. about 35,000. The city contains a custom-house, marine-hospital, opera-house, court-house, several public halls, and is the center of a very large trade in agricultural products. It is also important for manufactures.

EVAPORATION, the conversion of a fluid or solid into vapor. Steam, vapors of alcohol, camphor, iodine, etc., are familiar instances. All fluids are surrounded by vapor at common temperatures; but for every substance there is a limiting temperature, below which no E. takes place. The pressure, or tension, of a vapor depends mainly upon the nature of the substance evaporated, and the temperature to which it is raised. The full amount of vapor, however, is not produced instantaneously, and therefore, in general, *time* is an element in the question as well as temperature. See DIFFUSION.

The boiling-point (q.v.) is the temperature at which vapor is freely given off—i.e., at which the tension of the vapor of a substance is equal to the atmospheric pressure. Dalton gave an empirical law, which, however, is only at all approximate for temperatures near the boiling-point: "The tension of the vapor of a substance rises in *geometric*, as the temperature rises in *arithmetic*, progression." It is sufficient for our present purpose to notice, that the tension increases very rapidly with the temperature. Some curious consequences result from this. Thus, water boils at 212° F., under a pressure of 30 in., or at that temperature the tension of its vapor is *one* atmosphere. At 162° F., or 50° below its boiling-point, its vapor has a tension of 10 in. of mercury, and it will therefore boil, if placed in the receiver of an air-pump, as soon as two thirds of the air have been extracted.

If a little water be boiled in an open flask till the steam has displaced a great part of the contained air, and the flask be then tightly corked, the water will gradually cool. If the flask be now dipped in *cold* water, boiling recommences, the cold water having condensed some of the vapor, and so diminished the pressure on the contained liquid. Dip the flask in *hot* water, and the boiling ceases. These appearances may be obtained several times in succession.

A fluid cannot be heated above its boiling-point, at the ordinary pressure of the atmosphere; but if it be heated in a closed vessel, the tension of the vapor produced is to be taken in addition to the former pressure, and the boiling-point rises with it. Thus, when the pressure is equivalent to 2 atmospheres, the boiling-point of water is raised 40° F. At such temperatures, its solvent powers are greatly increased. Many minerals which are found in fine crystals are supposed to have been deposited from water which had dissolved them in large quantities, under the combined influences of pressure and temperature. Papin's digester (q.v.) depends upon this principle.

The amount of E. from a fluid depends upon many circumstances. As, except in the case of actual boiling, it takes place only at the surface, the amount of surface exposed is an important consideration where rapid and copious E. is required, as in steam-boilers, salt pans, etc. When, on the contrary, it is desirable to prevent E. as much as possible, a layer of oil, preventing direct contact with the air, is of great use. The rate of E. depends also on the pressure, and varies, according to Daniell, nearly inversely as the latter. His experiments, which appear trustworthy, were made in an exhausted receiver, and the vapor was removed as it was formed.

In the conversion of a fluid into vapor, a quantity of heat disappears; i.e., is required to produce and maintain the gaseous state. Thus, the temperature of steam at 30 in. is the same (to the thermometer) as that of the boiling water from which it comes off; but the heat necessary to convert a pound of water at 212° into steam at 212°, would raise nearly 1000 pounds of water from 60° to 61°. See HEAT. When, therefore a fluid evaporates, the vapor carries off heat from the fluid, and thus E. produces cold. This, of course, is matter of daily observation. Porous earthenware jars are employed to cool water in summer in this climate; and in India ice is procured by exposing water in shallow pans, laid on straw, to the combined effects of E. and radiation at night.

On the same principle depends sir John Leslie's method of freezing water. The water is placed in a flat porous dish, over a large surface of strong sulphuric acid, and the whole covered with the receiver of an air-pump. When a good vacuum has been produced, there is, of course, as we have already seen, a rapid E., and the acid eagerly absorbing the vapor as it is formed, the process goes on without further working of the pump, till the residual water has become a solid cake of ice. A most extraordinary

example of this production of cold is afforded by the freezing of water on a white hot plate—by no means a difficult experiment. A platinum capsule is heated nearly to whiteness by a lamp placed underneath; a little water, mixed with sulphurous acid, which is an extremely volatile liquid (indeed it is gaseous at ordinary temperatures and pressures), is poured upon the plate. The acid instantly evaporates, and the cold produced freezes the water, which can be dropped from the hot plate on the hand as a lump of ice.

Another remarkable instance of this occurs in the formation of solid carbonic acid. The liquid acid is forced by the pressure of its own vapor in a fine stream into the air from a nozzle in the strong iron vessel in which it is contained. It evaporates so rapidly in air that a portion of the stream is frozen, and the delicate snow-like mass can be collected by proper apparatus.

Having thus briefly examined some of the circumstances connected with E., we may proceed to mention some of its important bearings on meteorology. In this respect it is one of the most effective of all the gigantic processes that are continually going on around us. Watery vapor is continually rising invisible in the air; meeting with a colder stratum of the atmosphere, or the cold ridge of a mountain, it becomes condensed into mists or clouds; the fine particles of these unite into larger groups, and fall as rain, hail or snow—to be again evaporated by heat from the moist ground, or from rivers, lakes, and seas. Even when otherwise invisible, its presence may be detected by its deposition as dew (q.v.), and, according to Clausius, in the blue of the sky, and the gorgeous tints of sunrise and sunset. There is little doubt of its being also intimately connected with the scintillation of the fixed stars. See SCINTILLATION. Atmospheric electricity is largely due to E. directly as well as indirectly, on account of the amounts of vapor contained in different currents of air. It is matter of everyday observation how much the drying of the ground, or E. generally, is promoted by a brisk wind. This finds its explanation in the constant removal of the vapor as it is formed, the diffusion of the vapor taking place into comparatively dry air instead of the moist atmosphere into which it would take place in a calm. See RAIN and ATMOSPHERIC ELECTRICITY.

EVARTS, JEREMIAH, 1781-1831; b. Vt.; graduate of Yale; admitted to the bar in 1806, and in 1810 became editor of the *Panoplist*, a religious journal in Boston. In 1812, he became treasurer of the American board of commissioners for foreign missions, and in 1821 corresponding secretary. When the *Panoplist* gave place to the *Missionary Herald*, he became editor of the latter, and by many essays and other contributions showed himself a most efficient advocate and organizer of Christian missions. He also wrote 24 essays on the rights of the Indians.

EVARTS, WILLIAM MAXWELL, LL.D., b. Boston, Feb. 6, 1818; son of Jeremiah. He graduated at Yale in 1837, and studied in the Harvard law school under justice Story and prof. Greenleaf; was admitted to the New York bar in 1841; deputy U. S. district attorney, 1849–53, during which period he became conspicuous in prosecuting persons engaged in filibustering expeditions to Cuba. In 1853, he was counsel for the state of New York in the Lemmon slave case. In the impeachment trial of president Johnson, he was the leading counsel for the defendant, and in 1872 he was counsel for the United States before the tribunal of arbitration at Geneva. He was then and still is president of the New York bar association. Among many noted cases in which he has appeared are the Parrish will case; the will case of Mrs. Gardner, mother of the widow of president Tyler; as senior counsel for Henry Ward Beecher in the Tilton suit; and as advocate (on the republican side) before the electoral commission. He has made many public addresses, such as the eulogy on chief-justice Chase, the centennial oration at Philadelphia, and at the unveiling of the statues of Webster and Seward in New York. He was an early and active member of the republican party. In July, 1868, he was appointed attorney-general of the United States, and in Mar., 1877, became secretary of state, which office he now holds. All his public work shows high scholarship and affluent thought.

EVE (Heb. *Chavvah*, i.e., the living), the name, according to the Hebrew narrative, of the wife of the first man, and so the mother of the human race. See ADAM AND EVE.

EVEC'TION, a lunar inequality resulting from the combined effect of the irregularity of the motion of the perigee, and alternate increase and decrease of the eccentricity of the moon's orbit. See LUNAR THEORY.

EV'ELYN, JOHN, a well-known writer of the 17th c., was b. Oct. 31, 1620, at Wotton, the seat of the Evelyn family, in Surrey. He was educated at the free school of Lewes, and subsequently at Balliol college, Oxford. In 1640, he entered the middle temple, and in the following year, prompted by the ominous appearance of public affairs, and after having witnessed the trial of Strafford, he set out for the continent, returning, however, in the autumn of the same year. In 1642, upon offering his services to Charles I., he was accepted as a volunteer in prince Rupert's troop, but in 1643 he again went to the continent, where he mainly lived during the following eight years. After 1652, he settled in England, where he lived studiously and in private till the restoration, after which he was much employed by the government. On the organization of the royal

society, he became one of the first members, and was an industrious contributor to its transactions. He succeeded, in 1699, to the family estate at Wotton, and there, after a long, studious, and highly useful life, he died 27th Feb., 1706.

His pen seems to have been constantly employed, and that upon a great variety of subjects. Art, architecture, gardening, commerce, etc., were all treated of by E., and in such a manner as to produce the most beneficial results on his own time. His principal works are *Sculptura, or the History and Art of Chalcography and Engraving on Copper*, 1662; *Silva, or a Discourse of Forest Trees, etc.*, 1664; and his *Memoirs* (first published in 1818). It is to the last of these works E. owes the celebrity he now enjoys. The *Memoirs* are written in the form of a diary, by one who had accustomed himself to habits of close observation, and continued during a period of about 70 years—and these the most dramatic in the recent history of England. They are of inestimable value. Sir Walter Scott said that "he had never seen a mine so rich." New editions were published in 1850, 1854, and 1870.

EVEM'ERUS, or EUHEMERUS, a Greek scholar of the latter part of the 4th c. A.D. He is noted chiefly for his *Sacred History*, founded professedly on archaic inscriptions which he had collected during his travels in various parts of Greece, and more especially on those observed on the temple of Jupiter Triphylianus, in the island of Panchæa. In this work, he introduced a new method of interpreting the popular myths, asserting that the gods who formed the chief objects of popular worship were mortals who, as heroes and conquerors, had earned a claim to the veneration of their subjects. Till the end of the last century, there were many who accepted this system of Evemerus, and the early Christians especially appealed to it as a confirmation of their belief that the ancient mythology was merely an aggregate of fables of human invention. Evemerus was a firm upholder of the Cyrenaic philosophy, and by many ancient writers he was regarded as an atheist, because of his dissent from the prevalent polytheism. Of his work only a few fragments remain in a Latin translation by Ennius.

EVENING PRIMROSE. See ŒNOTHERA.

EVENING SCHOOLS may be divided into two classes: 1. Those which, either in the form of lectures or lessons, carry further the education received at school; 2. Those which exist to supplement the defects of early training, or, it may be, to give the simplest rudiments of elementary instruction to adults who are under the disadvantage of being pupils for the first time in their lives. The former are found chiefly in connection with mechanics' institutes* (which are now very numerous in Great Britain, and might form one of the most important educational agencies we have), existing day schools, and congregational organizations; while the latter more frequently fall under the head of parochial missionary work, or are connected with factories. These latter constitute the class of E. S. which engage the largest share of interest in the present condition of England, and which present the greatest difficulties in working.

The total number of E. S. of this humbler class (under government inspection) in operation in England and Wales was, in 1877, about 1733; of these, 1078 were conducted by the church of England, 340 by dissenting Protestant denominations, 62 by Roman Catholics, and 253 by school-boards. The total number of scholars in attendance was 50,203, of whom 40,320 were male. In Scotland, *primary* E. S. are not so usual as in England; and this is no doubt to be greatly attributed to the more general diffusion of education among children of the poorer classes.

Considering the large proportion of the present adult population unable to read or write, the number of E. S. is miserably inadequate. But the necessity for their institution has not yet been sufficiently felt by the country, to lead to their taking a much more important place in the educational machinery of the nation than they have hitherto done. Her majesty's inspectors, the royal commissioners (1861), and the clergy of all denominations, strongly recommend their greater extension. "If the education of the country were in a good state," say the commissioners, "E. S. would be nearly universal, and would serve to compensate the scantiness of the instruction given in day schools, by giving more advanced instruction to an older class of scholars."

State Aid, and Voluntary and Paid Teachers.—Many educationists have come to the conclusion, that the hope of retaining children in school until they have obtained as much instruction as is requisite for their guidance in life is a vain one, and consequently look to E. S. as an indispensable part of a national system of education, and consider them entitled to look to the state for encouragement and support to an equal extent with day schools. Bishop Hinds was the first *publicly* to suggest that E. S. fairly come within the sphere of state action, in a letter to Mr. Senior, printed in 1839. The recent inquiries have brought out that the majority of those who frequent existing E. S. have never received any elementary instruction, or have forgotten what they once knew, and that a large proportion are either adults or adolescent young men and women. They attend for the purpose of learning to read, write, and cipher. Though in many instances, especially where no fee is charged, the irregularity and unpunctuality of the attendance are great, yet in the majority of cases there is an earnest desire on the part of the pupils

* The working-man's college in London, and the school of arts in Edinburgh, both belong to this class.

to benefit by the instruction they receive. It is a question of some national importance how far schools of this supplementary class should be left to the action of private philanthropy. It is also a question, to some extent implied in the other, whether the peculiarly delicate work required in E. S. is not more efficiently discharged by voluntary than by paid laborers.

1. As to the first question, it may be safely said, that all would desire to see those wholesome channels of benevolence which connect the poor and the rich free from government interference; but if, in our devotion to a theory, we neglect the work, it becomes the duty of the state to see to it, to the extent of encouragement at least, if not of direction. Since bishop Hinds' letter, to which we have referred above, the education committee of the privy council have recognized this duty, and have given aid to a small extent to all E. S. complying with certain conditions, and in connection with day schools. By the revised code recently issued by the privy council, E. S. of this class are allowed to claim from the parliamentary grant a considerable sum calculated on the average attendance. The schools must be taught by certificated masters, and lay persons are alone recognized. To all those schools frequented for the purpose of confirming or extending previous knowledge, the grants made under the code will be of great assistance, and enable them to secure the services of trained teachers; to those which are chiefly frequented by adults wholly ignorant of the simplest elements, and chiefly conducted by voluntary teachers, it will afford little or no advantage, because the conductors will not be able to claim so large a sum as would suffice to pay the salaries of certificated masters. Nor, perhaps, is it desirable to interfere with this particular class of E. S.; it is of more importance, so far as state aid is concerned, that the education of the primary school should be confirmed by the establishment of E. S. for *boys and girls*. There is active benevolence enough abroad to overtake the ignorance of the *adult* population, if properly stimulated by the various religious bodies.

The proposed new arrangements as to payment may also lead to the greater separation of such schools into schools for boys and girls above 13 and under 18, and schools for adults. It is found that boys and men, girls and women, do not work well together.

2. As to the second question: in those E. S. which are only a continuation of the day school, the same method will generally be found to suit as in the primary schools; and therefore it seems advisable that they should be conducted by paid certificated teachers, acting under managers (as in the case of ordinary day schools), and claiming grants from the privy council. Those schools, again, which are frequented by adults, who come to receive the elements of reading, writing, and arithmetic for the first time, require more delicate handling, and a greater consideration of individual character and wants than are requisite in a school attended by boys and girls. In such cases, voluntary effort under the influence of religious or merely philanthropic motives appears to be the best agency. The ignorance of method displayed by such teachers, and the irregular manner in which many of them hang to their work, are no doubt serious difficulties; but they may be overcome by the institution of diocesan or other unions, in imitation of the East Lancashire union of E. S. under the presidency of sir J. P. K. Shuttleworth, with each of which might be connected an organizing master, who should itinerate among the schools, giving the benefit of his superior knowledge of method.

Subjects and Method.—As to subjects to be taught, we have little to say to that class of E. S. which continue the work of the day school. It is to be presumed that practical instruction (and what else should be aimed at in such schools?) will embrace the elements of those sciences which bear most directly on life. We refer to social economy and the laws of health. E. S. of the humbler and more urgent sort will necessarily confine themselves to reading, writing, and arithmetic, inventing such methods of teaching those subjects as will most directly touch the intelligence and engage the interest. The short period of attendance requires that *much* be done rather than *many things*. Through a well-constructed course of reading-books (unfortunately, there is no reading series for adults worthy of mention), all the general culture and specific information attainable will best be given. If such reading-books do not furnish adequate information on social economy in its domestic and its wider social relations, and on the laws of health, they sadly misunderstand their position in educational literature. Instruction in writing and arithmetic should be given in such a way as will naturally connect itself with the lives and daily necessities of the learners. But this is not the place to treat of the subject of method.

History.—Although we have directed attention to the fact, that bishop Hinds was the first in this country to advocate state recognition for E. S., he was by no means the first to feel the necessity that existed for them. The first school established exclusively for adults was at Bala, Merionethshire, in 1811, by the Rev. T. Charles. In 1812, a similar school was set on foot in Bristol by William Smith and Stephen Prout, a school which led to the establishment of the "Bristol institution for instructing adults to read the Holy Scriptures." In 1813, writing was included in the school programme; and in 1816, a society of the same kind was founded in London. In the course of a few years, 30 towns possessed similar schools. The first *evening* school proper for instructing boys and girls who had to work all day for a livelihood, was founded in 1806 at Bristol, by the "benevolent evening schools' society." The present statistics of E. S. have been already given.

In other countries of Europe, E. S. where they exist, have mainly in view the continuance of the education already received in primary schools. In France, however, the wants of untaught adults have been provided for by the establishment by law of E. S. suited to them. In all the states of Germany, provision is made more or less in the country districts, and always in the large towns, for continuing the instruction given in the primary schools. Schools for those who wish to learn reading and writing for the first time seem scarcely to exist, probably because they are not needed. The schools which do exist have a greater affinity to our mechanics' institutes than to any other kind of institution in this country. The instruction is given on Sundays and holidays, and in many places also on one or two evenings in the week. But Sunday instruction seems alone to have been originally contemplated. The subjects taught are the ordinary branches, with geography, free-hand and geometrical drawing, geometry, and in some cases the elements of natural science and the laws of health. These institutions are supported by the funds of the commune or district; in some cases supplemented by the state.

EV'ERDINGEN, ALLART VON, 1621–75; a Dutch painter of coast and inland scenery, particularly of Norway, where he suffered shipwreck. His favorite theme was a fall in a glen, with mournful fringes of pines interspersed with birch, and log huts at the base of rocks and craggy slopes. The water in his scenes tumbles over the foreground so as to entitle the painter to the name of "inventor of cascades."

EVEREST, Sir GEORGE, 1790–1866; b. Wales. He was employed in various engineering works in India, was assistant to the chief in the trigonometrical survey of that country, and on the chief's death became his successor. Afterwards he was surveyor-general of India. His achievements in surveys were of the highest order.

EVEREST, MOUNT, in the Himalaya range in Nepaul, Asia; the highest mountain peak on the earth, so far as known. A careful measurement in 1856 made its height 29,002 ft. above tide, or within 38 ft. of 5½ English miles.

EVERETT, ALEXANDER HILL, an American diplomatist and author, was b. at Boston, Mass., 19th Mar., 1792, and entered Harvard college in 1802. In 1806, although the youngest of the *alumni*, he graduated with the highest honors. After practicing for some time as a lawyer, he was appointed U. S. ambassador at the Hague in 1818; and went in the same capacity to Spain in 1825. Four years afterwards, he returned to the United States, where he became proprietor and editor of *The North American Review* (1830–35), and also occupied a seat in the legislature of Massachusetts. In the winter of 1840, he resided, as a confidential agent of the U. S. government, in the island of Cuba. He sailed for China as minister-plenipotentiary for that empire in 1845, and died at Canton, June 28, 1847. E. was a man of great versatility of talent and of extensive erudition. Politics and belles-lettres, political economy and poetry, statistics and æsthetics, alternately engaged his thoughts and pen. His writings are—*Europe, or a General Survey of the Political Situation of the Principal Powers*, etc. (London and Boston, 1822); *New Ideas on Population*, etc. (London and Boston, 1822); *America, or a General Survey of the Political Situation of the several Powers of the Western Continent*, etc. (Phila. 1827), in which he labors to show that Russia and the United States must in the long-run share the continent between them; *Critical and Miscellaneous Essays* (two series, Boston, 1845 and 1847). These are on a vast variety of subjects, and are probably the most interesting productions of his pen. E. also published a volume of poems in 1845.

EVERETT, EDWARD, a younger brother of the preceding, was b. in 1794, at Dorchester, near Boston, Mass., entered Harvard college in 1807, and took his degree in 1811. He was for some time a Unitarian clergyman in the town of Cambridge, and in this capacity had the reputation of being one of the most eloquent and pathetic preachers in the United States. In 1815, he was elected professor of the Greek language and literature in Harvard college; and to qualify himself more thoroughly for his work, he visited Europe, where he resided for four years, and had a distinguished circle of acquaintance, including Scott, Byron, Jeffrey, Romilly, Davy, etc. M. Cousin, the French philosopher and translator of Plato, pronounced him "one of the best Grecians he ever knew." In 1820, E. became editor of *The North American Review;* and in 1824, a member of the United States congress, sitting in the house of representatives for ten years. In 1835, he was appointed governor of Massachusetts; and in 1841, minister plenipotentiary to the court of St. James's. While in England, he received from the universities of Oxford, Cambridge, and Dublin the degree of D.C.L. On his return to America in 1845, he was elected president of Harvard college; on the decease of Daniel Webster, he became secretary of state; and in 1853, the legislature of Massachusetts chose him as a member of the senate of the United States. He died Jan., 1865.

E.'s principal works are: *A Defense of Christianity* (1814); *Orations and Speeches on Various Occasions from* 1825 *to* 1836 (1836); and *Orations and Speeches on Various Occasions from* 1825 *to* 1850. This includes all the previous orations. These *Orations*, as they are called, are upon all subjects, and, like the writings of his brother, indicate a varied, vigorous, and flexible genius.

EVERETT, EDWARD, LL.D. (*ante*), b. Dorchester, Mass., April 11, 1794; d. Boston, Jan. 15, 1865; an American statesman, orator, and scholar, son of Rev. Oliver Everett. He was at one time a pupil in a Boston school, of which Daniel Webster, in the absence of his brother Ezekiel, was the teacher. In 1811, when only 17 years of age, he graduated at Harvard with the highest honors of his class. While an undergraduate he had the principal charge of a students' paper called the *Harvard Lyceum*. In 1812, he was appointed tutor at Harvard, and while thus employed, found time to prepare himself for the ministry. He was ordained pastor of the Brattle street church (Unitarian) in Boston, Feb. 19, 1814. As a preacher his career was brilliant, though brief. He resigned his pulpit at the end of 13 months, when not quite 21 years of age, having accepted the Eliot professorship of Greek literature at Harvard. To fit himself more completely for his new position, he went to Europe and studied for two years in the university of Göttingen, receiving the degree of PH.D. He then traveled extensively in England and upon the continent, making special visits to Athens and Constantinople. In England he made the acquaintance of the most eminent men of that day, Scott, Jeffrey, Romilly, and Davy. His range of study during his residence abroad was wide, embracing not only the branches included in his professorship, but a close examination of civil and political law, and of the European systems of government. Upon his return in 1819, he entered upon the duties of his professorship, delivering at the outset a course of lectures on ancient Greece, its architecture and ruins, which he afterwards repeated in Boston. During the period of his professorship, which continued till 1825, he became the editor of the *North American Review*, to which he contributed a great number of articles. In 1824, in the presence of gen. Lafayette, he delivered the Phi Beta Kappa oration at Harvard, winning new fame by his thoughtful and eloquent presentation of the theme, "Circumstances Favorable to the Progress of Literature in America." On the 22d of Dec. of the same year, he delivered an oration at Plymouth that kindled for him a wide popular enthusiasm. In the same year (1824) he was elected to congress from the Cambridge district. He was subsequently re-elected for four successive terms, making his whole period of service in that body 10 years. During this whole term he was a member of the committee on foreign relations, and in the 20th congress its chairman. He also served on the library committee, and generally on that for public buildings. He was also a member of some important select committees. His familiarity with the science of government and with the public questions of the time, united with his high literary qualifications, and his acknowledged power as a speaker, fitted him for great usefulness in committees and upon the floor. Some utterances are on record which may be taken as early indications of his subsequent position on the question of slavery. On the 9th of Mar., 1826, he brought upon himself the rebuke of Churchill C. Cambreling, member from New York, but a native of South Carolina, for these words: "The great relation of servitude, in some form or other, with greater or less departure from the theoretic equality of men, is inseparable from our nature. Domestic slavery is not, in my judgment, to be set down as an immoral and irreligious relation. It is a condition of life as well as any other to be justified by morality, religion, and international law." "Sir, I am no soldier. My habits and education are very unmilitary; but there is no cause in which I would sooner buckle a knapsack on my back, and put a musket on my shoulder, than that of putting down a servile insurrection at the south." In 1835, he was elected governor of Massachusetts, holding the office by annual re-election until 1840, when he was defeated by a single vote. In his first message to the legislature, Jan., 1836, he took occasion to refer in deprecatory terms to the anti-slavery excitement of that day, and, alluding to the anti-slavery papers, which were almost universally denounced as "incendiary," he said: "Whatever by direct and necessary operation is calculated to excite an insurrection among the slaves has been held by highly respectable legal authority an offense against the peace of the commonwealth, which may be prosecuted as a misdemeanor at common law." As the governor was known to have at that moment in his official possession, to be communicated to the legislature, the official demands of several of the southern states for the enactment by northern legislatures of laws to suppress the anti-slavery societies and journals, this portion of his message created much excitement in the state, and intense alarm in the anti-slavery party. Remonstrances in large numbers, against the adoption of the proposed legislation, were sent to the legislature, and the remonstrants were accorded a public hearing before a special committee. After a severe struggle, the contemplated restriction of the freedom of the press was averted, and no effort was ever made to enforce the governor's suggestion in regard to proceedings under the common law for the same object. While in congress, Mr. E. was a constant contributor to the *North American Review*, and among his papers published therein, was one in which he very ably and successfully controverted the South Carolina doctrine of nullification. In 1841, he was appointed by president Harrison minister plenipotentiary of the United States to Great Britain. The news of this appointment reached him in Italy, whither he had gone for the purpose of engaging in historical work. He hastened to obey the call of his country, and entered at once upon the discharge of his official duties. The relations of this country with England at that time involved our minister in very grave responsibilities, which Mr. E. discharged in a manner creditable alike to the country and to himself. Returning home in 1845, he reluctantly accepted the presidency of Harvard university, giving the next

three years to strenuous labor in behalf of his alma mater. After his resignation, he established himself in Boston with the purpose of entering upon literary tasks long postponed. He prepared a collected edition of his own orations and speeches, which appeared in 1850. He also edited a new edition of the works of Webster, at his special request, and prepared a memoir of the author. From such congenial labors he was next summoned to fill the place of secretary of state in the cabinet of president Fillmore, made vacant by Mr. Webster's death. He held this position only four months, retiring at the close of president Fillmore's administration; but during this time several important questions of state received his careful attention. Before leaving the department of state he was elected to the U. S. senate. Feb. 8, 1854, he made a powerful speech in the senate in opposition to the abrogation of the Missouri compromise of 1820, which prohibited slavery in all the territories ceded by France to the United States n. of the line of 36° 30'. The object of this abrogation was to open to slavery the territories of Kansas and Nebraska. Mr. Everett having been a conspicuous supporter of Webster and the compromises of 1850, was in a position to make his influence felt upon this new issue, but the measure was carried in spite of his eloquent remonstrances. His health failing, he resigned his seat in the senate in May and retired to private life. After recovering his strength, he devoted himself for several years to the work of procuring funds wherewith to purchase Mount Vernon, the home and burial-place of Washington, to be held in perpetuity as a place of resort and pilgrimage. He prepared an eloquent discourse upon the life and character of Washington, which he delivered nearly one hundred and fifty times in different places in the country, devoting the proceeds to this object. He also engaged to contribute an article weekly for one year to the *New York Ledger* for $10,000, to be paid by the proprietor to the Mount Vernon fund. The articles were afterwards republished in a volume entitled *Mount Vernon Papers*. Giving his time gratuitously and paying his own traveling expenses, he raised over $100,000 in all for the Mount Vernon fund. He subsequently, by similar methods, obtained considerable sums for several public charities. In 1860, he was nominated for vice-president of the United States, with John Bell of Tennessee for president, by a small remnant of the whig party, which had fallen to pieces under the growing anti-slavery sentiment of that period. The ticket received 590,631 votes from a total of 4,662,170. When the rebellion broke out in 1861, he took his stand promptly among those who determined to maintain the union at every hazard. His patriotic addresses at this crisis were of great service, influencing as they did a large body of conservative men, who, like himself, had done all in their power to discourage and resist anti-slavery agitation. His oration at the consecration of the national cemetery at Gettysburg, Penn., Nov. 15, 1863, was a production creditable alike to his patriotism and his high literary ability. In the great crisis of 1864, when Lincoln was re-elected, Mr. Everett's name headed the list of presidential electors of Massachusetts, and his vote for Lincoln was the last act in his political career. Jan. 9, 1865, he spoke in Faneuil hall in behalf of the needy and suffering citizens of Savannah, and on the following Sunday, the 15th, he died. He received the highest literary honors from the great English universities as well as from his alma mater. He was a corresponding member of the institute of France, and enjoyed the friendship of the greatest men of his time in Europe and America. A statue of him by Ball stands in the Boston public library, and another, by Story, in the public garden.

EVERGLADES, a peculiar swampy region in s. Florida, in Dade and Monroe cos., about 160 m. long by 60 m. wide, s. of lake Okeechobee. The E. consist of a vast number of small and low islands, separated by channels in which the water is usually shallow. The islands are covered with dense thickets of pines, palmettoes, vines, and tropical shrubs, and the soil is very fertile. The water in the channels is concealed by tall grass. The country is almost entirely wild, and abounds in small game. A few Seminole Indians still inhabit the region.

EVERGREENS are those trees and shrubs of which the leaves do not fall off in autumn, but retain their freshness and verdure throughout the winter, and perform their functions during more than one season. Evergreen leaves are generally of thicker and firmer texture than the leaves of deciduous trees and shrubs. They have also fewer pores or *stomata* (q.v.), and these confined to their under surface. Evergreen leaves are sometimes very small, as in firs and heaths; sometimes pretty large, as in rhododendrons, laureis, magnolias, etc. E., both trees and shrubs, have always been much sought after by the landscape gardener, and for purposes of ornament and shelter. Some orders of plants consist exclusively, or nearly so, of E., whilst in others they exist only as exceptional species. Most of the *coniferæ* are E., and the somber green of pines, firs, cypresses, etc., is a prevalent characteristic of northern scenery both in summer and winter; whilst the undiminished thickness of the foliage affords winter shelter to animals which could not so well exist in forests composed merely of deciduous trees. Holly and ivy are amongst the finest British E.; the box, privet, and different kinds of bay and laurel, rhododendron, phyllirea, myrtle, etc., are also familiar to every one. As instances of genera in which some species are evergreen and others deciduous, may be mentioned barberry and cytisus. Many fine new ornamental E. have recently been introduced. As suitable for imparting a lively appearance, boughs

of E. are largely employed in Great Britain to decorate the walls of public places of assemblage, triumphal arches, etc., on festive occasions.

EVERGREENS (*axte*). The more plentiful and important of these beautiful trees and plants native in the United States are given in the following list:

White Spruce	*Abies alba.*
Hemlock	*Abies Canadensis.*
California Spruce	*Abies amabilis.*
Douglass Spruce	*Abies Douglassii.*
Mexican Spruce	*Abies Mexicana.*
Black Spruce	*Abies nigra.*
Red Spruce	*Abies rubra.*
Sabine's California Spruce	*Abies Sabini.*
California White Cedar	*Libocedrus decurrens.*
White Cedar	*Cupressus thyoides.*
Great Coned Cypress	*Cupressus macrocarpa.*
Mexican Cypress	*Cupressus Mexicana.*
Red Cedar	*Juniperus Virginiana.*
Great Flowered Magnolia	*Magnolia grandiflora.*
Balsam Fir	*Abies balsamea.*
California Noble Fir	*Abies nobilis.*
White Pine	*Pinus strobus.*
Yellow Pine	*Pinus mitis.*
California Yellow Pine	*Pinus brachypterus.*
California Nut Pine	*Pinus edulis.*
Jersey Pine	*Pinus inops.*
Scrub Pine	*Pinus Banksiana.*
Pitch Pine	*Pinus rigida.*
Long-leafed Pine	*Pinus australis.*
Pond Pine	*Pinus serotina.*
Spruce Pine	*Pinus glabra.*
Mountain Pine	*Pinus pungens.*
Loblolly Pine	*Pinus tæda.*
Lambert's Californian	*Pinus Lambertiana.*
Red Pine	*Pinus resinosa.*
Bald Cypress	*Taxodium distichum.*
American Yew	*Taxus baccata Canadensis*
Florida Yew	*Taxus Floridana.*
American Arbor Vitæ	*Thuya occidentalis.*
Giant Arbor Vitæ	*Thuya gigantea.*
California Torreya	*Torreya Californica.*
Great California tree	*Sequoia gigantea.*
Redwood	*Sequoia sempervirens.*

EVERLASTING FLOWER, the popular name of certain plants, the flowers of which suffer little change of appearance in drying, and may be kept for years without much diminution of beauty. They are plants of the order *compositæ*, having their flowers (heads of flowers) surrounded with an involucre; the scales of which resemble the petals of a corolla, but are rigid, membranous, and contain little moisture. Some species of cudweed (q.v.) (*gnaphalium*) are often called E. F., and the other plants which bear the name belong to nearly allied genera, but particularly to the genus *helichrysum*, which contains a great number of species, mostly natives of Africa. *H. arenarium* is frequent on dry sandy soils in many parts of Europe and the central latitudes of Asia. It is covered with a gray felted down, and has yellow flowers, which, when rubbed, emit a faint aromatic odor. It is often worn on the continent of Europe as an ornament in the hat, particularly by wagoners. *H. angustifolium* and *H. Stœchas*—shrubby species, natives of the s. of Europe—have larger yellow flowers. Some of the species have a powerful and pleasant aromatic odor. No species of *helichrysum* is a native of Britain. Several kinds of E. F. are frequently to be seen in our gardens, others in green-houses. The French call them *immortelles*, and in France they are often woven into circular wreaths, and placed beside recent graves, as emblems of immortality.

EVERSLEY, Viscount, ex-Speaker of the house of commons. CHARLES SHAW LEFEVRE, b. in 1794, is descended maternally from the Lefevres who came to England from Rouen on the revocation of the edict of Nantes. He was educated at Winchester and Trinity college, Cambridge, called to the bar at Lincoln's Inn in 1819, entered parliament in 1830, as a member for Downton, and represented Hants from 1831 to 1857. In 1839, he was chosen speaker of the house of commons; and re-elected in the parliaments of 1841, 1847, and 1852. He retired from the office in 1857, with a peerage and a pension of £4,000 a year. During the eighteen years of his speakership, he suggested and carried out many improvements in the forms and procedure of the lower house, tending to the dispatch of business. Tall, and dignified in person, affable and accessible to the younger members, and profoundly versed in the laws of debate and practice

of the house, he was admirably qualified, by nature and training, to be "first commoner of England."

EVESHAM, originally EOVESHAM, a municipal and parliamentary borough in the s.e. of Worcestershire, on the right bank of the navigable Avon, 15 m. s.e. of Worcester. It lies in a beautiful and fertile vale, and has some manufactures of agricultural implements. Pop. '71, 4,888. E. sends one member to parliament. An abbey was founded here about 700.

EVICTION, in the law of Scotland, is the dispossessing one of property, whether in land or movables, in virtue of a preferable title in the person of him by whom the eviction is made. The same expression is used in England as to property in land; but where the tenant is merely deprived of possession, it is called ouster.

EVIDENCE, LEGAL. Evidence is either parol or written, the former consisting of the statements of witnesses appearing personally in court, and which statements must be attested by an oath or solemn declaration; the latter consisting of records, deeds, and other writings.

A distinction—popular rather than legal—is commonly drawn between *direct* and *circumstantial* evidence. Evidence is said to be direct when the proof depends on the testimony of persons who swear to the fact in dispute as matter of personal knowledge: when the witnesses only swear to other facts from which the fact at issue may be inferred, the evidence is called circumstantial. The latter kind of evidence is usually regarded as inferior in value to direct. Yet it is sometimes held that circumstantial evidence may be the more trustworthy; for either the witnesses may be unaccountably mistaken, or may have designed to deceive, whereas, as Paley said, "circumstances cannot lie."

The tendency, both in England and Scotland, of late years, has been to abolish all restrictions on the admissibility of witnesses, and to bring the rule practically to what Blackstone stated it to be in theory, viz., "all witnesses that have the use of their reason are to be received and examined." The ground on which witnesses were formerly excluded was untrustworthiness, arising either from the character of the witnesses or their interest in the suit. Under the former head fell those who were legally infamous (q.v.); whilst the latter included, first, the party to the suit himself, and then all who were connected with him by the ties of family, or even of business, in any appreciable degree. Gradually, however, it came to be seen that, though witnesses subject to these objections were less valuable than others to the party adducing them, it by no means followed that their testimony was of no value at all, and that the safer course in all cases was to examine them, and then to allow their testimony to be invalidated by proof of their interest in the cause direct or indirect, or of their having been convicted of such crimes as to render it unlikely that they should speak the truth. The objections have thus become objections not to the admissibility or competency, but to the credibility of witnesses. The first of the very important statutes by which these changes were effected was 9 Geo. IV. c. 32, which permitted Quakers and Moravians to substitute a solemn affirmation for an oath; admitted the party whose name had been forged as a witness in prosecutions for forgery; and provided that no misdemeanor (except perjury) shall render a party an incompetent witness after he has undergone the punishment. Then came the Scotch act 3 and 4 Vict. c. 59, afterwards referred to, and the English act 6 and 7 Vict. c. 85, which provided that no person offered as a witness shall hereafter be excluded, by reason of incapacity from crime or interest, from giving evidence either in person or by deposition on any issue or inquiry civil or criminal, but shall be admitted notwithstanding he may have an interest in the matter in question, or in the event of the trial or proceeding, and notwithstanding that he may have been previously convicted of any crime or offense. The same principle was extended by 14 and 15 Vict. c. 99 to the parties to a cause, who are not only competent, but compellable to give evidence on behalf of either or any of the parties—subject only to exception where the question tends to criminate the person examined, or where one (now altered) sued for breach of promise of marriage, or any action or proceeding instituted in consequence of adultery. By 16 and 17 Vict. c. 83, the former statute, 14 and 15 Vict. c. 99, was amended to the effect that the husband or wife of the party shall be in the same position with the party himself, subject only to these exceptions—first, that the husband or wife cannot give evidence for or against each other in criminal proceedings (but now they may in suits for adultery), and that they cannot be compelled to disclose matters which they have learned by communications from each other during the marriage. The statutes by which the corresponding changes were effected in Scotland were 3 and 4 Vict. c. 59, 15 and 16 Vict. c. 27, and 16 and 17 Vict. c. 20.

The oath (q.v.) to "speak the truth, the whole truth, and nothing but the truth," is administered to witnesses in England on the New Testament; in Scotland, holding up the right hand. Quakers and all conscientious persons, of whatever religious denomination, who object to the use of an oath, as formerly observed, make a solemn affirmation (q.v.); and persons who are foreigners are sworn, or otherwise bound over to speak the truth, by such forms as are conceived to be appropriate to their respective creeds. The test of the amount of religious belief which will suffice to render a witness admissible, has been generally considered to be a belief in future rewards and punishments;

but there is no decision which fixes the point, and in England, belief in a God, and that divine punishment will be the certain consequence of perjury here or hereafter, is enough. To obviate captious objections, the sacredness of oaths was secured by 1 and 2 Vict. c. 105, which provides that all persons shall be bound by the oath administered in the form and with such ceremonies as such persons shall declare to be binding.

It is a general rule of the law of evidence, that a witness is not bound to criminate himself, and he may consequently decline to answer any question that tends to expose him to punishment as a criminal, or to penal liability, or to forfeiture of any kind. If the effect of the question be merely to establish that he owes a debt, or is otherwise subject to a civil suit, the exception will not hold, and he will be bound to answer it (46 Geo. III. c. 37). The rule in England is, that a counsel, attorney, or solicitor is not bound, or even entitled, to divulge the secrets of the cause with which he has been intrusted; and the recent Scottish act 15 and 16 Vict. c. 27, s. 1, preserves the same exception with reference to agents who shall at the time when so adduced be acting in that capacity. Neither can official persons be called upon to disclose matters of state, the publication of which might be prejudicial to the community. All other professional persons, however—lawyers not engaged in the cause, physicians, surgeons, and divines, must divulge all secrets relevant to the issue with which they have become acquainted, even in the strictest professional confidence. See CONFESSIONAL. Neither will a servant nor private friend be allowed to withhold a relevant act, though of the most delicate nature.

One witness in England is sufficient in law, unless in the case of treason, if juries believe him, and in long chains of evidence it is often impossible that more than one witness should be adduced to make out some of the links of it. In general, however, there will be some fact or circumstance which will act as a supplementary adminicle, if the testimony be reliable; and it is this fact which has rendered the practical effect of the opposite rule, which demands two witnesses, in Scotland, not very different. The want of a second witness is usually supplied by a witness to circumstances which are corroborative of the evidence of the first; and where the one witness is not so corroborated in England, he will rarely be believed. It is a rule that none but the best evidence shall be adduced, which means that secondary shall not be substituted for primary evidence where the latter is accessible; a rule founded on the presumption that such a substitution is probably prompted by a sinister motive. This rule applies to written as well as oral testimony, and excludes copies of documents, just as it excludes the "hearsay" of witnesses. See OATH, JURY, WITNESS, DEED, TESTING, etc. The best works on evidence in English are Taylor (English), Greenleaf (American), and Dickson (Scotch).

EVIDENCE (*ante*), in law, embraces all statements which a court permits or requires to be made by witnesses in relation to matters of fact pertaining to the case on trial, and all documents produced for the inspection of the court. The former is distinguished as parol, the latter as written evidence. Again, evidence is either direct or circumstantial. When a witness testifies to a fact in issue from his own personal knowledge, his evidence is direct; when he swears to other facts, from which the existence of the fact at issue is inferred, it is circumstantial. Generally direct evidence has more force than circumstantial, though the latter is sometimes of such weight as to carry conviction to a court or jury. Both are to be taken with some allowance for possible mistake or falsehood on the part of the witness. Evidence must be relevant to the issue, though it may embrace incidents in themselves irrelevant, but which are among the necessary surroundings of the fact to be proved. The contents of a document must be proved by the document itself if it be accessible; if not, then by a certified copy, or by oral evidence; the law requiring the "best evidence" procurable in each case. When a contract has been reduced to writing, parol evidence cannot be admitted to prove its contents; still less can any variations of its terms be thus proved. Courts presume, until the contrary is proved, that a document was executed on the day of its date. Alterations and interlineations in a deed are presumed to have been made before execution, but in respect to wills the rule is reversed. When the law requires an instrument, e.g., a will, to be attested, it cannot be used in evidence unless one attesting witness be called to prove its execution if such a witness be alive and capable of giving evidence. If there be no such witness, then the signature of at least one attesting witness, and of the person executing the deed, must be proved to be in their respective handwritings. A will thirty years old is held to prove itself; that is, there is a presumption in favor of its validity. The burden of proof lies on the person who asserts the affirmative. A presumption on the part of a court can be set aside only by evidence, and the burden of proof rests upon the party making denial. In criminal cases—in trials for murder, for instance—malice is presumed and requires to be rebutted by evidence. A person who has not been heard of for seven years, unless the circumstances are such as to account otherwise for his absence, is presumed in law to be dead. His wife may marry again without liability to punishment for bigamy. The effect of presumption is to establish against a party a conclusion which stands until he disproves it. In many states uninterrupted, undisputed possession for 20 years is held to establish a title to real estate. In some states a shorter period is sufficient. By the common law, if a wife commits a felony, other than murder or treason, in the presence of her husband, she is

not criminally liable, it being assumed that she was under coercion. This rule is greatly restricted in practice in the United States. It is a rule of law, to which, however, there are some qualifications, that a witness cannot testify to what he has heard another say, but to only what he himself knows. One of the exceptions to this rule is that the dying declarations of a murdered person as to the causes of his death and the person who committed the murder may be given in evidence by one who heard them. If a witness testify in a trial, his evidence may be proved in a subsequent trial. When doubts arise respecting the boundaries of land, or the pedigree of persons, and the question is material to determine the issue before the court, traditional evidence—in other words, declarations made long ago by persons supposed to have had knowledge of the subject—is sometimes admitted. The ordinary witness is confined to statements of fact; he cannot give an opinion, or state the inferences he draws from the facts within his knowledge. An "expert"—one skilled in some art or profession—is allowed and even required to give opinions as to the significance of facts whose meaning is not fully understood by a court or jury; e.g., a chemist may testify as to the effects of certain poisons upon the human system, or a surgeon may say whether in his opinion there has been malpractice in treating a wound. For reasons of public policy, the confidential communications between an attorney and client and between a husband and wife are excluded. "Secrets of state" and the deliberation of judges and juries are exempt from judicial investigation. A witness within the jurisdiction of the court is required to attend in person; if he be beyond the jurisdiction his testimony is taken by commission. Formerly parties to an action and others interested therein were not allowed to be witnesses, but they are now generally admitted, it being assumed that courts and juries will give due weight to the temptation which such witnesses may be under to swerve from the truth in their own interest. Persons of a defective understanding, or who are supposed to be insensible to the obligations of an oath, are held to be incompetent as witnesses. Persons convicted of an infamous crime are generally excluded. The tendency of law at present, however, is to widen the range of evidence as far as possible, and to regard many of the former grounds of exclusion as concerning not the admissibility but only the credibility of a witness. The party calling a witness is not allowed to ask him "leading questions"—i.e., questions which suggest their answers. The other party on cross-examination is not bound by this rule. A witness is not required to answer questions, when in doing so he must criminate himself. A witness may be impeached by proving that his reputation for truth and veracity is bad.

EVIDENCES OF CHRISTIANITY. Christianity is the religion growing out of a divine revelation the giving of which, in successive stages, extended from a remote period in the past to about one hundred years after the birth of Jesus Christ. From the beginning of the revelation to the present time it has been engaged in severe conflicts with the mightiest forces, and with whatever immediate outward result, it has maintained its hold on the human mind and has advanced in power. Thus the conflicts themselves become important factors in the strength of the evidences by which the authority of the revelation is upheld. 1. Moses, as a bearer of a part of the revelation, was brought into conflict with the Egyptians and inflicted on them, instrumentally, without human help, judgments and sufferings, the result of which was the deliverance of the Israelites from bondage, and the memorial of which is the Passover, instituted at the time and observed to this day by the Jews scattered over the world. 2. Moses came also into conflict with the barrenness of the wilderness, in providing for the sustenance of the Israelites, and with their turbulence and rebellion during their sojourn and wanderings there. The memorials of these conflicts are the wilderness itself, the law given there, and the Pentateuch written there. 3. Having traversed the wilderness, Moses, Joshua, and Israel were involved in a conflict with the nations of Canaan, on both sides of the river Jordan, the result of which was the conquest of the land; and the memorial of it is the land itself, illustrated by the book of Joshua, which (as has been said) bears a relation to Palestine as conquered by the Israelites, similar to that which doomsday book bears to England as conquered by the Normans. 4. Passing by minor conflicts between the Jews and the nations around them, we take notice of the great expedition of Sennacherib, king of Assyria, against them, and of its overwhelming defeat; to both which events the harmonious witnesses are the written records of the Jews and the sculptured records of Sennacherib. 5. Nebuchadnezzar, king of Babylon, desolated the land of Canaan, destroyed Jerusalem, burned the temple, and carried the Jews captive. The result of this judgment was their deliverance from idolatry, and the memorial of it is the book of Daniel with its splendid prophecies. 6. Cyrus, the conqueror of Babylon, might also have overwhelmed the Jews, but having been shown the prophecy of Isaiah, written 150 years before, in which he was mentioned by name and his success foretold, his spirit was stirred up to restore them to their own land. The memorials of the restoration were the temple rebuilded at Jerusalem and the synagogues erected throughout the land. 7. Alexander, in his rapid career of conquest, appeared before Jerusalem in anger against the Jews because they placed obstacles in his way. But when he was shown the prophecies of Daniel concerning the king of Grecia who was to conquer Persia, his anger giving way to joy, he treated the Jews kindly and placed many of them in the new cities that he built. Memorials of his change of feel-

ing towards them were furnished by Jewish synagogues built in the Greek cities and the Jewish Scriptures translated into the Greek tongue. 8. Antiochus the great, one of Alexander's successors, seized Jerusalem and desecrated the temple by offering heathen sacrifices therein. His course awakened the zeal of the Jews and imparted new life and purity to their religion. A memorial of this reformation was furnished by the restoration of royal government to the Jews. 9. The Romans next obtained entrance into Jerusalem and established their power over the land. For a time they gave regal and vice-regal authority to Herod and his successors. Afterwards they made Judea a province and continued to hold it until, on the revolt of the Jews, they destroyed the city and the temple, and sold the inhabitants as slaves. In the midst of this Roman domination the crowning event of human history occurred—THE ADVENT OF JESUS CHRIST THE SON OF GOD; and the still-enduring memorials of it are Jerusalem trodden down by the Gentiles and the going forth out of it of Christianity, strictly so called, unaided by physical power, to gain possession of the world. 10. Its first conflict, in this form, was sustained by Jesus himself against the chief forces of the Jews among whom he came. His visible power consisted in a holy and unselfish life, in words of instruction surpassing all that men have ever spoken, and in beneficent works transcending all that men have ever wrought. The first result of this conflict was, apparently, his defeat by the Jews, for, aided by the Romans, they accomplished the death of Jesus and his burial in a sealed and guarded tomb. But the conflict was renewed by his followers, who offered themselves as witnesses of his resurrection and produced conviction in the minds of thousands of Jews, while also they aroused hostility in the hearts of many others. As the preaching of "Jesus and the resurrection" spread into other cities and lands, the conflict with Jews was continued, producing, as before, conviction in many minds and also hostility in many hearts. And to this day, Christianity and the Jews are arrayed against each other in many lands. 11. Its next conflict was with heathenism in union with the state. Proclaimed, almost immediately, as a gospel for the nations, it was opposed by the adherents of all idolatrous religions rallying against it as a common enemy, and by the governing classes, whose jurisdiction in religious matters (as they thought) it usurped. Yet it prevailed from city to city and from land to land. Heathen temples were almost deserted, and the fires of sacrifice on their altars went out. Trophies of the victory were furnished by the acts and writings of the apostles, by the planting and growth of churches, the joyful death of martyrs, the courage of confessors, and the argumentative defenses of learned men. If at the moment of triumph, in the council of Nicæa, the presence of the emperor Constantine—assuming, in some sense, to be the head of the assembly—was a fatal mistake, introduced from the heathenism which he had as yet scarcely left, let it not be forgotten that many of the bishops who rose to receive him were marked with bodily mutilations or scars, the tokens of their fidelity to Christ. 12. The next conflict of Christianity was with philosophy. While it contended only with Jewish and idolatrous rites, philosophers treated it with contempt and easily remained ignorant concerning it. But in its advance it awakened the hostility of Celsus, Porphyry, and others, who attacked it as false and mischievous; and, on the other hand, Justin Martyr, its first great defender among uninspired men, wore a philosopher's robe. From this point forward Christianity continued to be opposed by many in the ranks of philosophers and to be corrupted by the admixture with it of the philosophic opinions prevalent around it. 13. Christianity contended, also, with barbarism rude and strong. In the ages that followed the inroad of the northern tribes on Rome this religion was the only power that held them in check, tempering their fierceness and finally subduing them to the obedience of faith. Yet here also, as in its contests with Judaism, paganism, and philosophy, it was itself corrupted by admixture with the opinions and habits of those who received it. 14. Its next great conflict was with Mohammedanism. The Saracens were overrunning Christendom with the sword and the Koran from the east and south, but in the west the barbarians who had become Christians broke their power and poured the forces of Europe upon the Holy Land. And from those times to the present the "eastern question," in some form, has arrayed Christian Europe against Mohammedan rule. 15. The next great conflict was in Christendom itself. The corruptions which had been introduced from the worldly power of Rome, from heathen idolatries, philosophic opinions, and barbarian superstitions, accumulated and grew until Christianity became, in many respects, a baptized heathenism. But from itself, through the teaching of the recovered Scriptures, its own reformation was commenced and was followed by a conflict more extended and severe than any which had been waged against it before. And after more than three centuries and a half this conflict has not ceased. 16. Its next conflict, partly occasioned by the errors of Romanism and greatly aggravated by them, has been with infidelity in various forms. The Italian infidels of the 16th c. were witnesses against themselves by their hypocrisy and vice; the English infidels of the 17th and 18th centuries were driven back by many earnest writers; the French infidels of the 18th c. hastening on the revolution and greatly increasing its honors, condemned their own religious errors by their political crimes; the German infidels of the 19th c., striving to dissolve Christianity into fable by the power of criticism, have left its foundations as solid as before. 17. The great conflict of Christianity in the present century is with the gigantic forces of modern heathenism. Having commenced the work

in the closing years of the last century, it has ever since steadily advanced with wiser counsel, more deliberate purpose, more thorough work, more liberal expenditure, and more enlarged success, to the overthrow of all false religions. A system of religion which has been contending so long against all these mighty forces; whose progress can be traced through 3,800 years, from the point where one man held its revelation as a promise of blessing for all the world, to the present time, in which millions enjoying the blessing themselves are pressing on the fulfillment among all nations—that system of religion must have more than human strength, it must be from God. The evidences by which its divine origin is established are co-extensive with human observation, thought, and history. A portion of them may be classified as follows:

I. EXTERNAL PROOFS. 1. Miracles wrought by Moses, Christ, and the apostles. 2. Prophecies already fulfilled and yet to be fulfilled; concerning Nineveh, Babylon, Tyre, Egypt, Petra, Bashan, Moab, Philistia, Damascus; the Babylonian, Persian, Grecian, and Roman empires: concerning the Jews, their deliverance from Egypt, entrance into Canaan, captivity in Babylon, restoration to their own land, destruction of their temple and capital city, with the long period during which it would continue trodden down by the nations, their wanderings and sufferings in many lands: concerning the Christian apostasy, the seven churches of Asia, and the unfolding of human history to the last days. 3. Historical testimonies to the genuineness and authenticity of the Scriptures.

II. INTERNAL PROOFS. 1. *Doctrines.* Concerning the being, perfections, and government of God; the origin of the worlds; the creation, nature, fall, sinfulness, redemption, and immortality of man. 2. *Moral and religious precepts.* The ten commandments; sermon on the mount; ethics of the epistles. 3. The person, character, and work of Jesus Christ; and the unity of all the Scriptures in him as the divine human Savior. In the Old Testament a deliverer is promised who would be one of the human race, yet would perform a work beyond human power; would descend from Adam, Abraham, Isaac, Jacob, Judah, David; would be born in Bethlehem, of a virgin mother, yet is eternal, the mighty God and Prince of Peace; would be subjected to humiliation, sorrow, suffering, death; and, because of these things, would be raised from the dead and exalted to the right hand of God as the Savior of men. The New Testament exhibits Jesus Christ as descended, in human nature, from Adam, Abraham, Isaac, Jacob, Judah, David, and born in Bethlehem of the virgin Mary; yet as in his divine nature the Son of God, Emmanuel, God with us: as subjected to humiliation, suffering, and the cursed death of the cross; yet rising again the third day and filling the New Testament, the church and heaven with his glory as God manifest in the flesh. This exhibition of Christ in all the Scriptures is a demonstration that he is the divine Savior and that they are inspired of God.

III. Experimental proof (combining both the external and internal) furnished by the rise and continued progress of Christianity and its effects on the character, condition, and hopes of mankind. Christianity contains a revelation from the living God, was founded by a living Savior, was embraced, through the power of the Holy Spirit, by living men, so that Christians existed before organized Christian churches, before the Christian Scriptures, before Christian customs, laws, or nations. Successive generations of Christians have been continued on the earth and have furnished living evidences of Christianity. The aggregate of Christian life, character, work, and influence throughout the world from the beginning to the present time is, to-day, the culmination of the proofs that Christianity is divine. See CHRISTIANITY, *ante.*

EVIL may be generally defined as that which is opposed to the divine order of the universe. It requires only a superficial observation to perceive, that there are many apparent exceptions to the pervading harmony and happiness of creation: there are convulsions in the physical world; there are suffering, decay, and death throughout the whole range of organic existence; and the appellation of E. is commonly applied to such phenomena. In the face of the human consciousness, such phenomena appear to be infractions of the general order and good, and it pronounces them *evil.* How far the internal feeling of wrong has been quickened and educated by such outward facts, it would be difficult to say, but, beyond doubt, they have exercised upon it a powerful influence. Every form of religion testifies to the recognition of evil in the external world, and superstition in all its shapes mainly rests upon it.

But it is in the sphere of moral life alone that the conception of E. can be said to hold good. After the light of science has explored the secrets of nature, and shown how all its apparent anomalies are merely manifestations of a comprehensive harmony, the idea of E. is dispelled from the material and merely organic creation. "Whatever is, is best," is seen to be everywhere the law of this creation. There remains, however, the ineradicable feeling of E. in human life and manners and history. There is in the moral consciousness of man a sense of violated order, of transgression of divine law, or what is called *sin*, which is *evil* in its essential form. This fact of E. is everywhere appealed to by the Christian religion; it is the aim of this religion to deliver men from its power and misery. Every ethical and judicial code is based upon its recognition, and is designed to protect human society from its injurious consequences. It cannot be better or more clearly defined than in the language already given, viz., the transgression of the divine law revealed in conscience and in Scripture.

The question of the *origin of evil* has been greatly discussed, and received various answers. The simplest and most direct of these answers is that which maintains a double origin of things, or a system of *dualism*. This conception lies at the bases of many forms of religion; it may be said to be the fundamental conception of all mere nature-religions. Interpreting the obvious appearances of nature, they embody in divine personalities its contending manifestations of light and darkness, benignity and terror. The opposition of Ormuzd and Ahriman in the old Zoroastrian faith is one of the most conspicuous examples of this religious dualism. Manicheism, which spread so widely in the 4th and 5th centuries, and the Syrian gnosticism from which it sprung, are also historical illustrations of the same principle.

The dualistic theory of the origin of E., however, could not obviously maintain itself with the advance of speculation and the spread of Christian truth. It was no less clearly a postulate of the cultivated reason than a dictate of divine revelation, that the world proceeded from One absolutely Divine Creator, holy and good, of whom, and through whom, and to whom are all things. It was necessary, therefore, to reconcile the appearance of E. with this fundamental admission

The doctrine of the fall, especially in the later form of development which connects it with the existence of a devil or evil spirit, tempting man in the shape of a serpent, was supposed to explain the appearance of E. in human history. Being tempted of the devil, man sinned, and so fell from his obedience to the divine law. This is the doctrine of orthodox Christian theology, and the answer which it gives to the inquiry, how sin came into the world? And many minds never think of carrying the inquiry further. It is clear, however, that this explanation of the historical origin of E. leaves the question of its real and absolute origin unsettled. The devil being assumed as the cause of man's sin, the further question arises, whence the devil? Is he an absolute personality? in which case we are landed in the old theory of dualism; or is he, according to the traditionary Christian conception, a fallen angel? in which case the question just returns, whence the spring of E. in him? There is no real explanation gained by this removal of the question; it is still the same difficulty—whence the origin of E. in the creation of an all-perfect being, almighty as well as all-wise and good?

Speculation may please itself with ingenious answers to this question, but in truth it admits of no satisfactory solution. Some, for example, have argued that E., like darkness or cold, is an indispensable element of alternation or contrast in human life. All individual reality is only the product of opposite forces working together. Character could only arise from the interaction of opposing ethical influences of good and evil. In nature, we have attraction and repulsion, rest and motion, positive and negative electricity; why should it be different in the sphere of morals? Here, too, there must be polarity. Good can only exist in contradistinction to E.; the one no less than the other is necessary to constitute the drama of human life and history. Others, again, have argued, that E. is the result of what is called metaphysical imperfection. God alone can be perfectly good. The creature, in its very nature, is limited, defective; and E. is nothing else than the evidence of this limitation in man. It is not something real or positive, but only a privation. It is in morals what cold and darkness are in physics, a pure negation. Thus have argued such profound thinkers as Augustine and Leibnitz. But it requires but little penetration to see that such arguments, however ingenious, and so far well founded, do not meet the essential difficulty of the problem. If E. be, according to such views, a necessary element of human life, in the one case, in order to develop its activity, in the other case, as clinging to its creaturely limitations, then plainly it is not, in the orthodox sense of the word, *evil*. It is not, and cannot be a contradiction of the true idea of human life, and at the same time a necessary element of it. Whatever necessarily belongs to life, must help its true development, and not injure and destroy it; must be *good*, in short, and not *evil*. Such theories, therefore, only solve the problem by eliminating the fact. The origin of E. must remain forever inscrutable; nor is it wonderful that it should. It is only in its ultimate sense conceivable as a quality of moral freedom, and moral freedom in man or any created being is a profound mystery. It is something which "we apprehend, but which we can neither comprehend nor communicate."

EVIL, KING'S. See SCROFULA.

EVIL EYE. Both in ancient and modern times, the belief that some persons have the power of injuring others by looking upon them, has been widely diffused. The Greeks frequently speak of the *ophthalmos baskanos* (or E. E.), which they conceived to be especially dangerous to children; and the Romans used the verb *fascinare* to express the same fact. Pliny speaks—not on his own authority, however—of "those among the Triballians and Illyrians, who with their very eyesight can witch (*effascinent*), yea, and kill those whom they look wistly upon any long time;" and Plutarch states, on the authority of Philaretus, that "the Thybiens who inhabited Pontus were deadly, not only to babes, but to men grown, and that whomsoever their eye, speech, or breath would reach, were sure to fall sick, and pine away." Menalcas, in Virgil (*Ecl.* iii. 102), also complains that some E. E. has fascinated his young lambs—

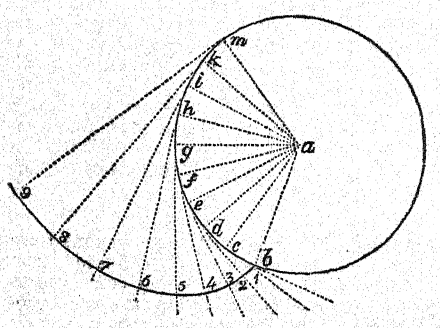
Nescio quis teneros oculus mihi fascinat agnos.

The principal amulet used by the ancients was the *phallus* or *fascinum*, as the Romans

called it, which was hung round the neck of children. Of course, this superstition, like all others, flourished in Europe during the middle ages. See Reginald Scot's *Discovery of Witchcraft;* the *Opusculum de Fascino* of John Lazarus Gutierrez, a Spanish physician, published in 1653; and the *Tractatus de Fascinatione* of John Christian Frommann, a physician of Saxe-Coburg, published in 1675. In the British isles, also, the belief in the power of the E. E. is of old date, and is by no means dead, at least in Ireland and the Highlands of Scotland. In these countries (as elsewhere), it was once a very common superstition that cattle were subject to injury in this way. Witches had the power to a malignant degree; and various charms, such as twining mountain-ash among the hair of the cow's tail, were used to avert or destroy their noxious influence. In the east it was and is no less prevalent. The Persians have various methods of discovering the special kind of fascination by which a person is afflicted; and Dallaway, in his *Account of Constantinople* (Lond. 1797) affirms that "nothing can exceed the superstition of the Turks respecting the E. E. of an enemy or infidel. Passages from the Koran are painted on the outside of the houses, globes of glass are suspended from the ceiling, and a part of the superfluous caparison of their horses is designed to attract attention, and divert a sinister influence." Hobhouse, in his *Travels*, bears equally conclusive testimony to the prevalence of this superstition in the Turkish empire, not among Mohammedans only, but also among Christians; while Lane, in his *Modern Egyptians* (1833), gives an account of the precautions taken by the Egyptians to avoid the influence of evil eye. The American Indians partake of the same belief; and it is not improbable that if the matter were still more profoundly investigated, it would be found that every nation that exists or has existed, with anything like a developed system of superstition, believes or has believed in the reality of fascination in some form or other.

The universality of this superstition goes far to prove that it has what may be called a *natural* origin; and, indeed, when we consider that the *eye* is the most expressive organ of the soul or mind of man, that through it are shot forth, as it were, into the visible world of the senses, the hidden passions, emotions, and desires of our nature, we will not wonder that in the "times of ignorance," when men could give no rational or scientific account of almost any physiological phenomena, if connected with psychology, the eye should have been superstitiously imagined to be a center of malignant influence. The eye is, in point of fact, as potent as superstition dreams: the error lay not in the recognition of its power, but in explaining the mode of its operation. The person who felt himself under the spell of a powerful gaze, was too agitated to calmly consider the cause of his terrors, and attributed to another results for which he himself was mainly responsible. It was really he that gave to the eye of his fellow-creature its baleful influence; and he quailed less before the force of character which it indicated, than before the fearful fancies with which his own timidity had invested it. For this disease, wherever it has existed, or does yet exist, there is no cure but that solid culture of the understanding from which comes a true strength of will and brain. See Fascination by Serpents.

Evolute and Involute. See Curvature and Osculating Circle. The evolute of any curve is the locus of the center of its osculating circle, and, relative to its evolute, the curve is called the involute. This is the simplest definition that can be given of an evolute and involute, which are relative terms. There is another, however, which may represent the relation of the curves more clearly to those who are not mathematicians. If on any curve a string be closely wrapped, and if the string be fastened at one of its ends, and free at the other; and then if we unwind the string from the curve, keeping it constantly stretched, the curve which would be traced out by a pencil fixed to the free end of the string, is called the involute of that from which the string is unwound, and relative to it, the latter is called the evolute. It is clear that the involute might otherwise be described by fastening a string at one extremity of the evolute, and wrapping it thereupon, keeping it always stretched. From either definition, it is clear that a normal to the involute at any point is a tangent to the evolute, and that the difference in length between any two radii of curvature to the involute is equal to the length of the arc of the evolute intercepted between them. The nature of evolutes was first considered by Huyghens, who showed that the evolute to a common cycloid is another equal cycloid, a property of that curve which he employed in making a pendulum vibrate in a cycloid. To describe the involute of a circle, proceed as follows: Let *a* be the center of the circle, and *b* the extremity of the string to be unwound from its circumference. Divide the circle, or part of the circle, according to the length of curve required, into any number of equal parts, as *c*, *d*, *e*, etc.; through these, from *a* draw radial lines; from



the points where these touch the circle, draw, at right angles to the lines *ac*, *ad*, etc., other lines, as in the diagram. With the distance *cb* as radius, from the point *c*, describe an arc *b*1, cutting the line *c*1 in 1. From the point *d*, with *d*1, describe an arc 1 2, cutting the line *d*2 in 2. From *e*, with *e*2, describe an arc 2 3, cutting the line *e*3 in 3. With radius *f*3, from *f*, describe an arc 3 4, cutting *f*4 in the point 4. Proceed in this way, describing arcs which pass through the points 5, 6, 7, 8, and 9. The involute will thus be formed.

EVOLUTION. See SPECIES, (*ante*).

EVOLUTION AND INVOLUTION, algebraical terms, the former signifying *the extraction of roots*, and the latter *the raising to powers*. When any number is multiplied by itself, the product is called its square, or second power. If we multiply the square by the number again, we get the cube, or third power; and so on. This process is called involution. Evolution is the inverse process, by which a number being presented, we may ascertain a particular *root* of it, say the fourth; or that number which, being multiplied into unity a particular number of times, say four times, the product will be the number presented. Both subjects will be found treated in all algebraical text-books. Evolution is more particularly considered under the head EXTRACTION OF ROOTS.

EVOLUTIONS, in military matters, are the movements of troops in order to change position. The object may be to maintain or sustain a post, to occupy a new post, to improve an attack, or to improve a defense. All such movements as marching, counter-marching, route-marching, changing front, forming line, facing, wheeling, making column or line, making échelon or square, defiling, deploying, etc., come under the general heading of evolutions. More minute descriptions of these and other motions will be given under TACTICS, MILITARY AND NAVAL. Other things being equal, the best E. are those which occupy least time and least space. The word evolution equally applies to the movement of ships in a fleet.

EVORA (ancient *Ebora*), a city of Portugal, capital of the province of Alemtejo, and, after Coimbra, and perhaps Thomar, the most interesting city in the country, is beautifully situated on a fertile and elevated plain, 48 m. w.s.w. of Badajoz, and about 80 m. e. of Lisbon. It was once a place of considerable strength; but its ramparts, and the towers which flanked them, its citadel, its forts, and its watch-towers, are now in a hopelessly ruinous condition. The town itself is not well built, its streets are narrow and winding, and its houses old and badly planned. It has a cathedral, a large Gothic edifice, founded in 1186, the choir of which, rebuilt in 1721, is in the Italian style, and is richly adorned with marbles of various colors. E. has been the see of an archbishop since 1541; has an archiepiscopal library, containing upwards of 50,000 volumes; and several pictures of great merit, attributed to Gran Vasco. It has manufactures of ironware and leather, and a well-attended annual fair. Pop. about 12,000.

E. is a very ancient city. Quintus Sertorius took it in 80 B.C. It was also conquered by the Moors in 712, but recovered from them in 1166. The Roman antiquities of E. are unrivaled in the peninsula. Among these, the temple of Diana, used as a slaughter-house for some time previous to the year 1834, exhibits in its fine Corinthian columns admirable proportion and delicacy of sculpture. There is also an aqueduct, 1200 paces in length, erected by Quintus Sertorius; but the most beautiful Roman relic, and one of the most perfect pieces of ancient architecture in existence, is the tower which rises in the city at the extremity of the aqueduct. It is 12 ft. 6 in. in diameter, and is surrounded by eight columns of the Ionic order. Ionic pilasters decorate the second story, and the top is crowned with a hemispherical dome. It is wholly constructed of brick, and covered with cement of such a durable nature that, although this delicate structure has existed since 70 B.C., few parts of it seem to have been impaired by time.

EVREMOND, CHARLES MARGOTELLE DE ST. DENIS, SEIGNEUR DE ST., an author and wit of the 17th c., was b. at St. Denis-le-Guast, in Normandy, April 1, 1613. He entered the army about the age of 15, became an ensign in less than a year, and in 1637 had the command of a company of foot. About this time, he gained the favor and friendship of Turenne, Grammont, the prince of Condé, and others of high rank, all of whom were delighted with the wit and cheerfulness of his conversation. Having talked himself into the esteem of these men, it was not long, however, until, by the same means, he brought himself under their displeasure. In 1661 his unbridled indulgence in raillery compelled him to take refuge in England. Many attempts were made at the French court to induce Louis XIV. to recall St. E., whose accomplishments, gayety, and wit, rendered him the delight of all who had not smarted from his sarcasm; but Louis remained immovable until 1689, when he granted the exile permission to return. It was now, however, too late. St. E. had by this time surrounded himself with an admiring circle of the wits and beauties of the English court, and resolved to remain where he was. He died in his 91st year, in Sept., 1703.

St. E.'s works, comprising comedies, classical essays, etc., were first correctly published by Des Maizeaux, with a life of the author (Lond. 1705). The works are also translated into English by the same editor.

EVREUX (anciently *Mediolanum*, and more recently *Eburovices*), an episcopal city of France, in the department of Eure, of which it is the capital, is pleasantly situated in

a valley on the Iton, a feeder of the Eure, 60 m. w.n.w. of Paris. It is well built, its streets regular, and the environs prettily laid out in promenades, gardens, and vineyards. The principal building of E. is the cathedral, which dates from the 11th century. The other buildings of note are the abbey church of St. Thaurin, originally built over the tomb of St. Thaurin, the first bishop of E., and having a shrine executed in the 13th c., which once contained his relics; the bishop's palace, built in 1484; and the *Tour de l'Horloge* of the same century. E. has extensive manufactures of bed-ticking, woolen stuffs, cotton-yarn, leather, vinegar, and a trade in its manufactures, and in grain, seeds, timber, and liqueurs. Pop. '76, 11,453.

E. is remarkable for the numerous sieges which it has sustained. It was taken by Clovis from the Romans; was sacked and plundered in 892 by the Northmen, under Rollo; was burned by Henry I. of England in 1119; and in 1194 and 1199 it was twice captured by Philippe Auguste king of France, into whose hands, after a short time, it permanently came. It was frequently taken and recovered in the wars between France and England during the reigns of Henry V. and Henry VI. of the latter country.

VIEIL EVREUX (*Old Evreux*), a village near E., and the supposed site of the ancient Mediolanum, has some ancient remains of a theater, an aqueduct, and fortifications.

EWALD, GEORG HEINRICH AUGUST VON, one of the greatest orientalists of the 19th c., was b. 16th Nov., 1803, at Göttingen, and exhibited a predilection for oriental literature even in his school-days. He studied at the university of his native place, and while still a student, wrote a work on the composition of Genesis (*Die Composition der Genesis*, Braunschw. 1823). In 1823, he became a teacher at the Wolfenbüttel gymnasium; in 1827, extraordinary, and in 1831, ordinary professor of philosophy at Göttingen; and in 1835, was appointed nominal professor of the oriental languages. Travels in search of oriental MSS. led him, in 1826, 1829, and 1836, to Berlin, Paris, and Italy. After the death of Eichhorn, the critical exegesis of the Old Testament was included in his duties as professor of the oriental tongues. The first, and perhaps the most important fruit of his new labors, was his Critical Grammar of the Hebrew Language (*Kritische Grammatik der Hebr. Sprache*, Leip. 1827), an abridgment of which was published at Leipsic in 1835, under the title of Grammar of the Hebrew Language (*Grammatik der Hebr. Sprache;* 5th edit., 1844); and a still simpler epitome in 1842, entitled Hebrew Grammar for Beginners (*Hebr. Sprachlehre für Anfänger*). Before this, however, E. had acquired a high reputation by his work on Canticles (*Hohe Lied Salomo's*, Gött., 1826); his Commentary on the Apocalypse (*Commentarius in Apocalypsin*, Leip. 1828); his Poetical Books of the Old Testament, in 4 vols. (*Die Poetischen Bücher des Alten Bundes*, Gött. 1835–37); and his Prophets of the Old Testament, in 2 vols. (*Die Propheten des Alten Bundes*, 2 Bde., Stutt., 1840). Between the years 1843–50, E. published an important work, in 4 vols., on the History of the People of Israel until the Time of Christ (*Geschichte des Volkes Israel bis auf Christus;* Eng. trans. 1869–74), and a subsidiary volume on the Antiquities of the People of Israel (*Die Alterthümer des Volkes Israel*). The *Geschichte des Volkes Israel*, together with its two continuations, The History of Christ and his Time (*Geschichte Christus und seiner Zeit*, 1857), and the History of the Apostolic Age, etc. (*Geschichte des Apostolischen Zeitalters bis zur Zerstörung Jerusalems*, 1858), is regarded as E.'s greatest work. But Jewish history and literature did not limit the sphere of E.'s wonderful activity. His lectures at Göttingen embraced the literature of the Arabic, Persian, Aramaic, and Sanscrit tongues, and gave birth to such works as that on the Meters of the Arabian Songs (*De Metris Carminum Arabicorum*, Leip. 1825); on Some of the Older Sanscrit Meters (*Ueber einige ältere Sanscrit-Metra*, Gött. 1827), an epitome of the Arabic author Wakidi's work on Mesopotamia (*De Mesopotamiæ expugnatæ Historia*, Gött. 1827), and a Grammar of Arabic, entitled *Grammatica Critica Linguæ Arabicæ cum brevi Metrorum Doctrina*, 2 Bde. (Leip. 1831–33). In 1832, E. published at Göttingen several very important Dissertations on Oriental and Biblical Literature (*Abhandlungen zur orient. und biblischen Literatur*), and planned the well-known periodical, Journal for the Knowledge of the East (*Zeitschrift für die Kunde des Morgenlands*). E., however, was not only a scholar and philologist, but a man of strong political convictions. Having, along with six of his colleagues (the others were the brothers Grimm, Dahlmann, Gervinus, Weber, and Albrecht), protested against the abolition of constitutional law and liberty in Hanover by the new sovereign, Ernest Augustus (previously duke of Cumberland), he was dismissed from his situation, 12th Dec., 1837, and went to England to investigate its public libraries, whence he was called to Tübingen, in 1838, as professor of theology. Here he remained for ten years, during which he was involved in many strifes. In 1841, he was ennobled by the king of Würtemberg. In 1848, E. returned to Göttingen, where he established a Year-book of Biblical Science (*Jahrbuch der biblischen Wissenschaft*), in which, as well as in his work on the Synoptic Gospels (*Die drei ersten Evangelien*, Gött. 1850), and works on the Epistles of Paul (*Die Sendschreiben des Apostels Paulus übersetzt und erklärt*, Gött. 1857), he strove to give a firmer basis to New Testament criticism and exegesis. E. also paid great attention to Ethiopic literature, a result of which is his valuable Dissertation on the Book of Enoch (*Ueber des Æthiopischen Buches Henoch Entstehung*, etc., Gött. 1856). Later works were *Das Sendschreiben an die Hebräer und Jacobos' Rundschreiben* (1871); and *Sieben Sendschreiben des Neuen Bundes* (1871). The distinguishing peculiarity of E., as a

theologian and critic, was his love for the concrete forms in which divine truths are revealed in history, and his dislike of the abstractions into which they are refined away by overspeculative theologians. He regarded it as the especial glory of the Jewish people, that they never lost sight of the concrete—as the Persians and Hindus, for example, did, with whom the realities of religion vanished into the most intangible dreams—but kept it ever before them until, in the fullness of times, there was born in their midst Jesus of Nazareth, the Perfect and Only One, in whom humanity reached its spiritual consummation. E. refused to class himself or to be classed with any theological party in Germany. He was equally opposed to the extreme left represented in Tübingen, and to the extreme right represented in the modern Lutheran movement headed by Hengstenberg. When Hanover was, in 1866, incorporated with Prussia, E. declined to take the new oath of allegiance, and was accordingly required to retire from the functions of the professoriate. He returned to political life; and as the three times elected representative of the town of Hanover in the reichstag, persistently opposed the new political conditions. He died in May, 1875.

EWALD, JOHANNES, one of the best lyric poets of Denmark, was b. at Copenhagen on the 18th Nov., 1743, and d. in the same city in 1781. In his 16th year, when his friends were about to send him to the university of Copenhagen, the restless impatience of restraint which had always characterized him, led him to make his escape to Germany, where he entered as a private soldier in the army of Frederick the great of Prussia, from which he soon deserted to the Austrians. His bravery having attracted the notice of his superiors, he was offered a commission, but this he refused to accept, as it would have obliged him to become a Catholic; and having induced his friends to purchase his discharge, he returned to Copenhagen in 1760, after having taken part in the great campaigns of 1759–60. He now began the study of theology, but a disappointment in love drove him to abandon it, and gave his attention solely to poetry. The first production of E. which attracted general notice was the funeral ode which he wrote on the death of Frederick V. of Denmark in 1767, and which exhibited so much original genius, that it at once raised the young poet to the rank of one of the best writers of his country. This successful attempt was rapidly followed by the appearance of numerous tragedies, operas, and songs, which are remarkable for great lyric beauty. In 1770, appeared the prose tragedy of *Rolf Krage*, which gives evidence of a careful study of Shakespeare and the English dramatists of the Elizabethan age. Although *Balder's Doed* (1773), which breathes the heroic spirit of the ancient bards of the north, and exhibits the specially national tendency of E.'s genius, is regarded by some critics as his *chef d'œuvre*, *Fiskerne*, "The Fisherman" (1780), probably deserves to rank equally high, when considered as a mere lyrical production. His habits of dissipation, and the decided opinions which he expressed in reference to politics, brought him into difficulties of every kind, while his infirmities of temper, and irregularities of conduct, estranged the affection of his nearest relatives, and in the latter years of his unhappy life he was often indebted to the charity of strangers for the means of subsistence. Some of his nautical songs have been raised to the dignity of national odes, and many of his occasional pieces rank among the sweetest poems of his country. He was engaged at the time of his death in compiling an autobiography, and in bringing out the complete edition of his writings, which finally appeared in 1792. His works have also been edited by F. L. Liebenberg (Copen. 1850–55); and a life of E., compiled from hitherto unpublished materials, has recently appeared from the pen of F. C. Olsen, of Copenhagen.

EWBANK, THOMAS, 1792–1870; b. England. He emigrated to New York in his youth, and was appointed commissioner of patents in 1849. He published, besides other works, a *Descriptive and Historical Account of Hydraulic and other Machines, Ancient and Modern;* and *Thoughts on Matter and Force.*

EWELL, RICHARD STODDARD, 1816–72; b. District of Columbia; graduated at West Point, served on the western frontier, on the coast survey, and in the war with Mexico —being engaged at Vera Cruz, Cerro Gordo, Contreras, Churubusco, Molino del Rey, and Chapultepec; was captain of dragoons in 1849, and was engaged on the Gila and Pinal Apache expeditions. He joined the southern forces in the war of the rebellion, serving in the Manassas campaign, at Blackburn's Ford and Bull Run, at White Oak Swamp and Cedar Mountain; was defeated at Kettle Run, was in the second battle of Bull Run, and was wounded in the Maryland campaign; became lieut.gen. in 1863, succeeding Stonewall Jackson. He was taken prisoner April 6, 1865, a few days before the close of the war.

EWING, FINIS, 1773–1841; b. Va.; one of the fathers of the Cumberland Presbyterian church. He was licensed to preach, and in 1803 was ordained by the Cumberland presbytery. His ordination not being recognized by the Kentucky synod, the presbytery being dissolved, and the action of the synod being sustained by the general assembly, he with two others, in 1810, formed the nucleus of the denomination known as the Cumberland Presbyterian church. In 1820, he removed to Missouri, where he died.

EWING, THOMAS, LL.D., 1789–1871; b. Va.; educated by his own exertions, and admitted to the bar in Lancaster, O., in 1816, soon becoming a prominent and successful lawyer in that state. In 1831, he was sent to the U. S. senate, where he soon became

known as opposing the confirmation of Martin Van Buren as minister of England, and president Jackson's measures generally. In 1841, he was appointed by president Harrison secretary of the treasury. Disagreeing with president Tyler (who succeeded Harrison only a month after the latter's inauguration), Ewing, with all the other cabinet officers except Webster, resigned. Under president Taylor he was the first secretary of the new department of the interior, and when Fillmore succeeded Taylor he was appointed senator from Ohio for the unexpired term of Mr. Corwin, then appointed secretary of the treasury. He retired from public life in 1851.

EWING, THOMAS, Jr., b. Ohio, 1829; son of Thomas. He was chief-justice of Kansas, and served in the union army during the war of the rebellion, rising to brevet-maj.-gen. of volunteers. He is a member of congress, where he is a leading democratic advocate of what are known as "greenback views."

EXAMINATION OF A **BANKRUPT.** See BANKRUPTCY.

EXAMINATION OF A **PRISONER,** in Scotland. See DECLARATION.

EXAMINATIONS FOR THE **PUBLIC SERVICE.** Up to the year 1855, all the junior appointments in the several branches of the civil service were made upon a system which was practically one of simple and unchecked nomination. Examinations nominally existed in a few of the departments, but they had degenerated into an unmeaning form. As a result, inefficient or objectionable persons were not unfrequently admitted to the service; and about 1853, much doubt existing as to the efficiency of the public offices, the treasury appointed a commission to report upon the best method of making first appointments to them. The commission advised the adoption for this purpose of competitive examinations, and in 1855 a move was made in the direction pointed out in their report. In May of that year, an order in council appointed civil service commissioners, whose duty it was to be to examine into and certify the qualifications of persons nominated to junior situations in the civil service. Before granting their certificate the commissioners were to ascertain that, in respect of age, health, character, knowledge, and ability, the person proposed to be appointed satisfied the conditions prescribed for the department to which he had been nominated—such conditions being previously fixed for each department, with the assistance of the commissioners, according to the discretion of its chiefs. The power given to the commissioners by the order in council was therefore only that of rejecting persons nominated for appointments when found to be unqualified, according to standards laid down for the commissioners. But a limited system of competition was for some departments at once introduced—several persons being nominated to compete for a vacant place, and the commissioners by examination selecting the best qualified. The rule applicable to junior appointments in the civil service remained as stated above till 1870. Up to that time, by far the greater number of appointments were made after a qualifying or test examination of persons nominated. In the smaller class of cases in which limited competition was admitted, the qualifying or test examination which preceded the competition usually proved fatal to a large proportion of the nominees; and the number of competitors for each place was too small to give the system of competition a real trial. Competition, however, had from 1855 been employed for the selection of members of the civil service of India. It has also been introduced in the case of first appointments to both the Indian and the imperial medical services, to the scientific branches of the army, and to the public works department of India. It was inevitable that it should either be carried further or abandoned altogether, and public opinion was in favor of carrying it further. A committee of the house of commons made a report in favor of competition in 1859; and subsequently a resolution to the same effect was carried in the house of commons. Session after session, the general adoption of competition was urged upon the government by men of influence and position in parliament. Accordingly, in June, 1870, Mr. Lowe being then chancellor of the exchequer, an order in council was issued which made success in an open competition the chief portal to the home civil service.

The new order made certificates of qualification necessary for all such persons as might "be proposed to be appointed, either permanently or temporarily, to any situation or employment in any department of the civil service," excepting only such as might be formally excepted in a manner hereafter described. Rules as to the age, health, character, and knowledge and capacity of persons appointed were still to be settled for each department; but under this order they were to be settled by the civil service commissioners and the chief authorities of each department acting together on equal terms, subject to the approval of the treasury. All appointments to situations included in a schedule appended to the order were to be made by means of competitive examinations, and this schedule embraced nearly all the principal public departments. A second schedule contained a list of appointments to which the order was not to extend; and provision was made for adding situations to, and for withdrawing them from, either of the schedules. It was also provided that examination must be dispensed with where the qualifications requisite for a situation were professional or otherwise peculiar, and not ordinarily to be acquired in the civil service, or where the chief of the department to which it belonged, and the treasury, agreed in thinking it for the public interest that examination should be omitted; the commissioners in such

cases to grant their certificate upon other evidence of fitness, and upon evidence of qualification in respect of age, health, and character. The second schedule excepted from the operation of the order—that is, placed entirely above the control of the commissioners—all situations to which the holder is appointed directly by the crown; all situations included in any order made by the treasury under section 4 of the superannuation act of 1859 (which provides for the superannuation of persons introduced under exceptional circumstances into the civil service); and all situations which are filled in the customary course of promotion by persons previously serving in the same department. Additions have since been made to it of situations to which, on account of the temporary nature of the employment, or of the qualifications required, examination was not deemed to be applicable. Some additions have also been made to the former schedule. Under the teaching of experience, too, many situations of the humbler sort have been withdrawn from it—e.g., those of boatmen and watermen in the customs, of office-keepers, messengers, porters, in all public offices, of warders and matrons in prisons, of excise preventive men in the inland revenue; and for these a test examination only is now employed.

The examinations established by the commissioners, in pursuance of the order in council of 1870, were adapted to the then existing organization of the public offices; and first appointments to clerkships and similar situations in public offices were divided into two classes—the one intended to be filled by persons of high acquirements, who were to perform the more important parts of official duty, the other to be filled by persons of less extended attainments, whose duties were intended to be more or less mechanical. Candidates for the former class of appointments were to be between 18 and 24 years of age, and had to pass a preliminary test examination in handwriting, orthography, arithmetic, and English composition. The subjects of the competitive examinations of this class were English composition, including *précis* writing, English history, English language and literature; language, literature, and history of Greece, Rome, France, Germany, and Italy; natural science, moral science, jurisprudence, and political economy. The competitors might take up all or any of those subjects, but got marks only in subjects of which they showed a competent knowledge; and those who stood highest, up to the number of places to be filled, were the successful candidates. Mathematics and the classics counted heavily in the examination. For the inferior grade of appointments, candidates were to be between 16 and 20 years of age, and had to pass a preliminary examination in handwriting, orthography, and arithmetic. The subjects of the competitive examination were handwriting, orthography, arithmetic, copying manuscript, indexing or docketing, digesting returns into summaries, English composition, geography, English history, and book-keeping. In both classes, the successful candidates were, in order of merit, allowed to choose to which of the situations assigned for competition they should be appointed, provided that they were found qualified under the special regulations applicable to the offices which they respectively selected. For a humbler but very numerous class of appointments in the public service, consisting of second-class (out-door) assistantships of excise and the out-door service of the customs, a third variety of examination was instituted, the subjects being handwriting, spelling, arithmetic and English composition. Candidates in this case were to be between 19 and 22 years of age, and examinations took place simultaneously in all the chief towns in the United Kingdom. The examinations for admission to the two grades of clerkships take place in London, Edinburgh, and Dublin only. Besides the examinations above described, special modes of testing comparative fitness were adopted in the case of a few appointments demanding peculiar, e.g., technical qualifications.

An order in council of 19th Feb., 1876, introduced important changes as regards the lower division of civil service clerks. The subjects of examination for this class remaining what they had been, the minimum age of candidates was raised from 16 to 17 years (provision being made, however, for the appointment—by competition in a more limited number of subjects—of boy-clerks between 15 and 17 years of age). Successful candidates were deprived of the right to choose out of the places vacant the office to which they should be appointed, and were made liable to serve in any office to which, not merely at first, but from time to time, the civil service commissioners should appoint them. Under this order, moreover, the number of persons selected at each examination is to exceed the number of places at the time vacant by 10 per cent. And while appointments are to be given, as a rule, in the order of a list made out according to merit, as shown in the examinations, that order may be departed from, if the needs of particular offices seem so to require; and provision is made, that if a candidate remains unplaced at 25 years of age, his name shall be struck off the list. The order has raised the period of probation after appointment from six months to a year; but the civil service commissioners may give a trial in another office to a candidate rejected after probation. The order further prescribed, having in view that the lower division should be strictly confined to duties more or less mechanical, that the salaries of the clerks should rise from a minimum of £80, by a triennial increment of £15, to a maximum of £200 a year—extra pay, not to exceed £100, being, however, provided for cases of special merit; and that promotion from the lower to the higher division should take place only exceptionally, on the special recommendation of the head of a department, with the assent of the treasury, and on a special certificate granted by the civil service commissioners.

Substantially, this order carried out the recommendations of a treasury commission presided over by Mr. Lyon Playfair. The recommendations of that commission as to the appointments to clerkships of the higher division have not yet (June, 1879) been adopted. These involved even a more considerable departure from the principle of the system introduced in 1870, than has been made in the case of the lower division. The commission advised that there should be a preliminary test-examination open to persons above 17 years of age, and a subsequent examination (also a test rather than a competitive examination) open to persons between 18 and 23 years of age, in a certain number of subjects selected by each candidate from a list of subjects prepared by the civil service commissioners in consultation with the heads of departments. All candidates who showed a certain proficiency in the subjects chosen by them would be put on a list made out in alphabetical order, and be eligible for, though having no right to, appointment to the higher division. Appointments would be made from the list of persons eligible by the heads of departments—the candidates getting the right to refuse places offered to them, without forfeiting their eligibility. This scheme, as the commission allowed, would involve a partial return to patronage. It should be said that it was accompanied by a proposal that every member of the higher division should be allowed to rise (from a minimum of £100) to a maximum of £400 a year, and that extra pay, not to exceed £200 a year, should be awarded in cases of special merit.

The abolition of the system of purchase in the army has been followed by a great extension of the use of competitive examinations. First appointments to the cavalry and infantry are now given on the results of examinations open to all youths between 17 and 20 who can pass a preliminary examination in elementary mathematics, translation from some modern language, writing English from dictation, geometrical drawing, and geography. The subjects of the competitive examination in this case are so arranged as to give great weight to classics and mathematics, while not excluding such branches of knowledge as English history and literature, the French and German languages, and some of the natural sciences, and offering a special premium for proficiency in drawing. The examinations are held three times a year, and are under the direction of the civil service commissioners. Admission to the royal military academy at Woolwich, the portal to commissions in the engineers and artillery, is also obtained by competition in examinations superintended by the commissioners. First appointments to the supply and transport subdepartment of the commissariat and ordnance store department of the army are similarly filled up. The civil service commissioners have also under their charge the examinations for the civil service of India (q.v.); for the selection of persons to be trained for service in the India forest department; and for admission to the Indian civil engineering college, in all of which the system of open competition prevails.

EXAMINATION OF A WITNESS. See EVIDENCE.

EXANTHE'MATA (from a Greek verb, to effloresce, or come out in a rash), a class of febrile diseases (see FEVER) attended by distinctive eruptions on the skin, appearing at a definite period, and running a recognizable course. To this class belong small-pox, chicken-pox, measles, scarlet fever, and, according to some authorities, plague, typhus, erysipelas, etc.

EXARCH was the title first conferred by Justinian on his commander-in-chief and vicegerent in Italy. The conquest of Italy by the Goths in the early part of the 6th c. was a severe blow to the Byzantine pride; and Justinian determined to wipe out the disgrace, and recover the imperial territories. The execution of this project was intrusted at first to Belisarius (q.v.), and afterwards to Narses (q.v.), by whom the reconquest of Italy was effected. The latter was the first who bore the title of E.; and the district over which he ruled was called the *exarchate*. The seat of the exarchs was Ravenna, the different towns and territories belonging to them being governed by subordinate rulers, styled *duces* or dukes. The extent of the exarchate, however, was gradually diminished, until it embraced only the country about Ravenna, the present Romagna, and the coasts of Rimini as far as Ancona. This was brought about partly by the conquests of the Longobards, partly by the dukes of Venice and Naples making themselves independent. In the year 728, even this small portion fell, for a short time, into the hands of the Longobards. In 752, Astulf, or Astolphus, king of the Longobards, put an end to the Byzantine rule at Ravenna; but in 755, he was compelled to resign the exarchate to Pepin the less, king of the Franks, who gave it over to the bishop of Rome, Stephanus II.—In the Christian church, E. was originally a title of the bishops, afterwards of a bishop who presided over several others—a primate. It was borne by the bishops of Alexandria, Antioch, Ephesus, Cæsarea, and Constantinople, till it was finally exchanged for the title of patriarch. A superior over several monasteries was also called in ancient times an exarch. The same title is also borne, in the modern Greek church, by the person who "visits" officially, as a sort of legate of the patriarch, the clergy and churches in a province.

EXCAMBION, in Scotland, is the legal name for an exchange of lands. Heirs possessing under deeds of entail are empowered by the so-called Montgomery act (10 Geo. III. c. 51) to exchange or excamb certain portions of the entailed lands. The portions exchanged must not include the principal mansion-house or offices, or the garden, park,

home-farm, or policy, or more than one fourth in value of the estate. As to the conditions under which, and the proceedings by which, excambions of entailed lands are effected, see Bell's *Law Dictionary*.

EXCELLENCE, or EXCELLENCY, a title now given to ambassadors, as representing not the affairs alone, but the persons of sovereign princes, to whom it was formerly applied. The privilege of being addressed as "your excellence," and of demanding a private interview with the prince to whom he is accredited, are the chief distinctions between the privileges of an ambassador, and an envoy or minister plenipotentiary. See AMBASSADOR, EMBASSY.

EXCHANGE, a term applied to buildings or places of resort for merchants. The name bourse (purse) is applied in France and Belgium to a resort of this kind; and in Berlin, Hamburg, and other German cities, there is the equivalent word börse. Exchanges have usually comprehended an open quadrangle, surrounded by an arcade, free to all persons; but in some cases large reading-rooms now constitute resorts of this kind, and these are open only to a body of subscribers, and visitors whom they introduce. Of this description are the exchanges of Manchester and Glasgow.

Exchanges originated in the commercial cities of Italy, Germany, and the Netherlands, from which last-named country they were copied by England. The merit of introducing them is due to sir Thomas Gresham, who, having resided as British agent at Antwerp in 1550, chose the bourse of that city as a model for the royal E. of London. Their institution in England is therefore coincident with the rise of commercial prosperity at the middle of the 16th century. The first stone of Gresham's burse, for so it was originally called, was laid June 6, 1566, a site being found for it by removing eighty houses in Cornhill, and it was finished in Nov., 1567. It consisted of a quadrangle with an arcade; above was a corridor with stalls, for the sale of wares. This corridor was called the *pawn*—believed to be a corruption of *bahn*—Ger. for path or walk. Outside were shops. On Jan. 23, 1570–71, the burse was ceremoniously opened by queen Elizabeth immediately after dining at the house of sir Thomas Gresham in Bishopsgate street. Having viewed the whole burse, the queen, by herald and trumpet, caused it to be proclaimed "the royal exchange." This first E. of London was almost entirely destroyed by the great fire of 1666. A new E. was forthwith erected on the spot, and opened Sept. 28, 1669. This second royal E. had the same fate; it was destroyed by fire, Jan. 10, 1838. The foundation-stone of the third E. was laid by prince Albert, Jan. 17, 1842. Completed in three years, at a cost of £150,000, from the designs of W. Tite, it was opened Jan. 1, 1845, by her majesty queen Victoria.

The term E. seems to have been naturally adopted from the circumstance that buying and exchanging of merchandise, and also exchanging and paying away of money, formed the chief object of concourse. In the present day, early intelligence in matters affecting commerce and public finance forms a principal attraction of this kind of resort. Although open daily, there are usually certain days and hours of meeting when the throng is considerable. The meeting is familiarly called "Change." The two great days of meeting at the royal E., London, are Tuesdays and Fridays, and the busiest time is from 3 to 4 o'clock. At this time are seen the greatest people on change; some of whom, such as the Rothschilds, occupy a well-known spot.

In London there are several other exchanges, but for special purposes; among these are the corn E. in Mark lane, the coal E. in Lower Thames street, the hop and malt E. in Southwark, the hide and skin E. or market in Bermondsey, and the stock E., near the bank of England. Exeter change, which was a sort of bazaar, with a menagerie of wild beasts, stood in the Strand, upon or near the site of the house of the earl of Exeter; the building, as an interruption to the thoroughfare, was removed in 1829. Numerous additions have recently been made to the list of exchanges in the large towns of England and Scotland; and among smaller towns, the Plait hall at Luton, opened in 1869, may be regarded as an E. for the straw-plait bonnet and hat trade. Corn exchanges are now numerous. In foreign countries, the bourse at Paris, and the merchants' E. at New York, are noteworthy for architectural elegance.

EXCHANGE, in political economy, is sometimes applied to the conversion of the money of one country into its equivalent in the money of another—as by stating the relation which French napoleons and francs bear to British pounds. The technical meaning of the word has now, however, come to be the difference between the actual value of money, taken by the standard of bullion, in any two places with relation to each other. If, in London, it costs more than £100 to pay £100 in St. Petersburg, the rate of exchange is against the former town, and in favor of the latter; an inhabitant of which will be able to pay a debt of £100 in London with less than £100 worth of bullion in St. Petersburg. The process will be best explained by analyzing it through means of simple examples. If Thomson & Co. of London buy £100 worth of wine from De la Rue of Paris, and De la Rue, on the other hand, buy £100 worth of cotton goods from Thomson & Co. of London, the two debts, *were there no others between the merchants of the same towns*, would extinguish each other, and there would be no necessity either for transmitting money or drawing bills of exchange. Suppose, however, that it is not De la Rue, but his neighbor Bonchamp, who has bought the £100 worth of cotton goods from Thomson & Co., then the debts of all will be settled by Bon-

champ paying £100 to De la Rue on Thomson & Co.'s account. Suppose, next, the case of De la Rue being due nothing to Thomson & Co., and Bonchamp being due them only £50, a like sum has to be otherwise found. Van Pradt of Amsterdam is due precisely this sum to Thomson & Co., while either De la Rue or Bonchamp is due the same amount to Van Pradt for a purchase of Gouda cheeses; then it is clear that the several debts can be adjusted among them without the transmission of bullion. It will cost some trouble to adjust the payments, however, and this trouble will have to be paid for. As in paying Thomson & Co. their debt of £100, De la Rue will have to pay for this trouble, the rate of exchange will be against him. If the debt, or any part of it, cannot be met by such an adjustment out of cross debts and credits, it will be necessary for the debtor to send bullion to his creditor; and this being an expensive process, it throws the rate of exchange against the debtor who so pays. For instance, if the sum due by the Frenchmen to Van Pradt was only £25 instead of £50, then De la Rue would have had to be at the expense of sending £25 to London in bullion. No such actual transactions take place in the existing mercantile world, because the accounts in debtor and creditor connected with the three towns above referred to are to be counted in thousands, and ramify into other towns; but the above examples may be held to represent the groups of debtors and creditors, as algebraic signs represent quantities. The individual merchants in one trading town have no idea how the surplus of debit or credit may lie between them, far less can they tell how it may be adjusted by debits and credits in other towns; but through the agency of bankers, bill-discounters, and other persons who deal in money, the relations of all trading-places towards each other are in a constant state of shifting and adjustment; and any one who has to pay a debt in any trading-place can find out how much he has to give to get that debt paid, and can pay it accordingly. When, through the operation of these complicated transactions, you require to give more than £100 in London to get that amount paid in Paris, then the rate of exchange is against London, and is in favor of Paris, where less than £100 in cash will pay a debt of £100 in London. The difference will generally depend on the difficulty of adjusting questions of debt and credit throughout the field of European commerce, in such a manner as to get the debt paid. If it cannot be paid by adjustment, then bullion must be sent; and thus it is generally said that the rate of exchange against any place is limited by the charge of transmitting bullion to it. The rate of exchange is liable to be brought to a level also by commercial exportation and importation, since, whenever it is expensive to get money sent to a country, there is a temptation to send goods to that country, to compensate the debt. In the general circle of transactions of this kind, the state or town which has the largest amount of transactions will have the largest number of debtors and of creditors, and will thus afford the chief facility for each compensating the other. It is thus that London is the center of the money market, where all the debts and credits in the world may be said to meet and extinguish each other. While the old notions about the balance of trade (q.v.) existed, it was supposed that the nation which the exchange was against was going to ruin; while that which it was in favor of was prospering through the other's loss. At present, it is inconvenient and expensive to a country to have the exchange against it. An adverse exchange generally indicates a sort of break in the circle of trade, which it would be advantageous to fill up, and *may* be caused by the commerce of a country decreasing; on the other hand, however, the imports for which a country pays in cash or in expensive bills, may be the same as a highly advantageous traffic. Gold-producing countries find bullion their most advantageous export, and the same is the case with countries into which gold has flowed in excess.

EXCHANGE, DEED OF, in English law, a common law assurance, whereby persons severally seized of lands, mutually grant them in exchange, each his own land for that of the other. In order to a valid exchange, five things are necessary: 1. The two subjects must be of the same nature, as lands for lands, chattels for chattels, but not real for personal estate. 2. The parties must take an equal estate; thus, an estate in fee cannot be exchanged for an estate tail. 3. The word "exchange" must be used. 4. There must be entry, and if either party die before entry, his heir may avoid the exchange. 5. Since the statute of frauds (29 Car. II. c. 3), if the interest be larger than a term for three years, the exchange must be in writing. A mutual warranty and right of entry was formerly implied in an exchange. This effect of the deed has been taken away by 8 and 9 Vict. c. 106, s. 4. By the 8 and 9 Vict. c. 118, s. 92, called the common inclosure act, the commissioners are empowered to make exchanges for the better carrying out of the purposes of the act. A deed of exchange closely resembles in its particulars an excambion (q.v.) in Scotland.

EXCHANGES, MILITARY, are certain arrangements made between officers of the English army. An officer may exchange, or change places, in the guards, or line, with another of equal rank in any regiment of the above corps, by mutual consent, and subject to the approval of the minister of war, and on payment of a sum agreed upon between the officers. On the abolition of the system of purchasing commissions in 1871, the sum paid in effecting an exchange was limited to the actual cost thrown upon the officer exchanging. In view, however, of the general wish of the army, a bill was introduced into parliament in 1874 (but was withdrawn as regards that session), to render

again legal the payment of money as a bonus for exchanges. In the following year (1875) the bill, having been again brought forward, was passed. As each of the exchanging officers enters his new corps at the bottom of his rank, exchange benefits officers who stick to their regiment, by advancing them towards the top of the list, and therefore nearer to promotion. An officer on full-pay may exchange with another on half-pay, provided a younger life be not thereby added to the half-pay list, and subject always to the consent of the secretary for war. Exchanges are ordinarily arranged by the army agents.

EXCHEQUER, CHANCELLOR OF THE. The office of chancellor of the exchequer, in modern times, will be accurately described when we say that he is the first finance minister of the crown. Strictly speaking, he is the under-treasurer, the office of lord high treasurer being now vested in the lords commissioners of the treasury. When the prime minister is a member of the house of commons, he sometimes holds the office of chancellor of the exchequer. The judicial functions of the chancellor of the exchequer may now be considered matter of history. See EXCHEQUER, COURT OF. When the chief baron and the barons are equally divided in opinion, he may be required to rehear the cause with the barons, and to give his opinion. But the last instance in which this was done was in 1735; and though the decision which sir Robert Walpole gave is said to have given great satisfaction, the custom is not likely to be reverted to.

EXCHEQUER, COURT OF, now the exchequer division of the high court of justice in England, is the court wherein all matters relating to the royal revenues are adjudicated upon. It is said (Madox, *Hist. of Ex.*, i. 177) that as early as the reign of William the conqueror a court of exchequer was in existence. This was probably nothing more than a branch of the *Aula Regia*, or great council of the nation; but on the subdivision of that court in the reign of Edward I., the court of exchequer acquired a separate and independent position. The special duty then assigned to the court was to order the revenues of the crown, and to recover the king's debts and duties. The court was then denominated the *scaccarium*, a word derived, it is said, from *scaccus* or *scaccum*, a chessboard; and it was so called because a checkered cloth was anciently wont to be laid upon the table of the court (Madox, *Hist. of Ex.*), a practice which, until the late act, prevailed in the court of exchequer in Scotland. The court formerly consisted of two divisions, an equity, and a common law or plea side. Lord Coke (*Inst.*, iv. 118) appears to doubt whether the equitable jurisdiction of the court can be traced back further than the statute 33 Henry VIII. c. 39. This equitable jurisdiction of the exchequer was abolished by 5 Vict. c. 5, and transferred to the court of chancery. On the first institution of the court, the business was chiefly confined to matters connected with the royal revenue, but a privilege was conceded to all the king's debtors and farmers, and all accountants of the exchequer, to sue and implead all manner of persons. This privilege was exercised by means of a writ of *quo minus* (now abolished by 2 Will. IV. c. 39), wherein it was set forth that the plaintiff being a debtor of the king, was, by reason of the wrong done to him by the defendant, deprived of the means of discharging his debt to the crown (*quo minus sufficiens existit*). The benefit of this writ was by degrees extended to all the lieges, on the fiction that they were crown debtors. By this means the court of exchequer acquired a concurrent jurisdiction with the other courts of common law. The judges of the exchequer consisted originally of the lord treasurer, the chancellor of the exchequer, and three puisné judges; these last were called barons of the exchequer. The title of baron is said by Mr. Selden (*Tit. of Hon.*, 2, 5, 16) to have been given to the judges in the exchequer because they were anciently made of such as were barons of the kingdom. The chancellor of the exchequer sat only on the equity side of the court. The last occasion on which he was called upon to exercise his judicial functions was in the case of Naish *v.* the East India company, when the judges were equally divided in opinion. This case occurred in Michaelmas term, 1735, when sir Robert Walpole was chancellor of the exchequer. The court now consists of six judges —viz., the chief baron, and four barons of exchequer. From this division of the high court, the appeal is to the court of appeal.

The court of *exchequer chamber* was formerly a court of all the judges in England assembled for decision of matters of law (Coke, *Inst.*, iv. 110, 119). Lord Campbell states that the lord chancellor was in the habit of adjourning cases of extraordinary importance into the exchequer, that he might have the opinion of the twelve judges (*Lives of the Chancellors*, i. 10). But the ordinary jurisdiction of the court of exchequer chamber was as a court of error, in which capacity it revised the judgments of the three courts of common law. This court was established by 31 Edw. I. c. 12, for the purpose of reviewing the decisions of the common-law side of the court of exchequer, and was composed of the judges of the other two courts—viz., the queen's bench and the common pleas. By 27 Eliz. c. 8, it was enacted that the judges of the common pleas and exchequer should form a second court of exchequer chamber, for review of certain cases in the queen's bench. But this intermediate court of appeal was abolished by the judicature act of 1873, as inconveniently composed, and somewhat unnecessary. An appeal now lies from each division of the high court of justice in England, direct to the court of appeal, which succeeded to the jurisdiction formerly vested in the house of

lords, as the supreme court of appeal, and consists of the lord chancellor, and the chiefs of the divisions, and the judges of the privy council.

In Scotland before the union, the exchequer was the king's revenue court. It consisted of the treasurer, the treasurer-depute, and as many of the lords of exchequer as the king was pleased to appoint (Ersk. i. 3, 30). The Scottish court of exchequer was continued by the 19th article of the treaty of union, until a new court should be established, which was effected by 6 Anne, c. 26. A privative jurisdiction was conferred on the court as to questions *relating to* revenues and customs of excise; and as to all honors and estates real and personal, and forfeitures and penalties arising to the crown within Scotland. But questions of *title* to lands, honors, etc., were reserved to the court of session. The judges of the court were the high treasurer of Great Britain, the chief baron, and four other barons; and English barristers as well as Scotch advocates were allowed to practice in the court. In cases of difficulty, and where there was a collision of jurisdictions, it was formerly not unusual to hold conferences with the barons; and the form of desiring the conference was to send the lord advocate, and, in his absence, the solicitor-general, to request a meeting, though it has been doubted whether they were bound to carry the message (Shand's *Practice*, 27). By 2 Will. IV. c. 54 it was provided that successors should not be appointed to such of the barons as should retire or die, and that the duties of the court should be discharged by a judge of the court of session. And now, by 19 and 20 Vict. c. 56, the court of exchequer is abolished, and the jurisdiction transferred entirely to the court of session.

The court of *exchequer chamber* in Ireland was established by 40 Geo. III. c. 39, but was abolished as an intermediate court of appeal between the Irish courts and the high court in England.

EXCHEQUER BILLS, bills issued at the exchequer under the authority of acts of parliament, as security for money advanced to the government. They contain an engagement on the part of the government for the payment of the principal sums advanced with interest. These bills form the chief part of the unfunded debt of the country. They were first issued in the reign of William III., in the year 1696, and were drawn for various amounts from £100 to £5. At that time they bore interest at the rate of 3*d.* per day on £100 (Macaulay's *History of England*, iv. 700). The interest was reduced to 2*d.* during the reign of Anne. During the war 1793–1814, the rate of interest was usually 3½*d.* At present, it is generally from 1½*d.* to 2½*d.* per £100 per diem. Holders of these bills are exempt from all risk, except that arising from the amount of premium or discount they may have given for them. The bills pass from hand to hand as money, and are payable at the treasury at par. They may also be paid to government in discharge for taxes. When it is intended to pay off outstanding exchequer bills, public notice is given by advertisement. The advances of money to the government by the bank of England are made on exchequer bills. These bills are a convenient means whereby the government can meet a sudden demand for unusual expenditure. The amount of exchequer bills unprovided for in 1877–78 was £4,593,800. Another portion of the unfunded debt is constituted by exchequer bonds, with fixed rates of interest for definite periods. Between 1877 and 1878 the outstanding exchequer bonds, owing to army expenditure in connection with the eastern question, rose from £7,550,000 to £10,239,200.

EXCHEQUER TALLIES, seasoned wands of ash, hazel, or willow, formerly used for checking accounts in the English exchequer. The sum acknowledged was inscribed on the tally, on the other side of which the same sum was inscribed in Roman characters, together with the payer's name. Notches marked upon the tally indicated by their form the class to which the account belonged. This tally was split, and the payer received one half, which he presented for payment, and which was first matched with the half remaining in the office. It is said that this rude device, which was retained till 1783, was a very perfect protection against fraudulent claims.

EXCIPIENT (Lat. *excipio*, I receive), an inert or slightly active substance, introduced into a medical prescription as a *vehicle*, or medium of administration for the strictly medicinal ingredients. Thus conserve of red roses, or bread-crumb, is used to make up pills; sulphate of potass, or white sugar, in medicinal powders; water, mucilage, white of egg, and many other substances in fluid mixtures.

EXCISE, the name of a tax on commodities, from the Latin *excisus*, cut off, as being a portion of the value of the commodity cut off and set apart for the revenue before the commodity is sold. This is not its actual nature, however, for the manufacturer who looks to a profit on his outlay does not give part of the value to the revenue; he merely counts the tax as part of his expenditure which he intends to get back with a profit, so that it constitutes an addition to the ultimate price which the purchaser or consumer has to pay. A tax on commodities sold and bought is a very obvious one, but it has generally appeared in the simple shape of a toll on goods brought to market; and the complicated arrangements for officially watching the process of a manufacture for the purpose of seeing that none of the dues of the revenue are evaded, is of comparatively modern origin. It was first introduced into England by the long parliament, who established an E. on liquors in 1643. Though always unpopular, the E. in some form or other has ever since continued to be a material element in the taxation and revenue of Britain.

In the earlier part of last century, sir Robert Walpole entertained the notion of enlarging its productiveness while mitigating its proportional pressure, by the bonding system, which suspends the exaction of the duty until the goods are sold, and thus leaves the manufacturer all his capital to be devoted to production. See WAREHOUSING SYSTEM. But the rumor of an enlargement of the unpopular E. duty created a general excitement, and the memorable cry of "Liberty, Property, and no Excise," compelled Walpole to abandon his project.

An E., when compared with other taxes, has its good and its bad features: it is a method of extracting money for national purposes from personal expenditure on luxuries, and is especially serviceable when fed from those luxuries the use of which in excess becomes a vice. On the other hand, it renders necessary a system of inquisitorial inspection, not only very offensive to all free people, but very open to abuse and fraud; while at the same time excessively high duties, and duties on commodities strictly of domestic manufacture, lead to smuggling and all its demoralizing consequences. The evils of an E. were formerly aggravated by the practice of farming the duties—that is, by letting them to the highest bidder, whose interest it became, like any other contractor, to make the greatest possible profit by his speculation, and consequently to exact the duties in the most rigorous manner. In every well-regulated revenue system, it is of course only fair to all parties that the duty as the law lays it on should be fully exacted; but in the age of farming, the arrangements were all slovenly, and there was much latitude of power in the hands of the farmers. The farming system became very oppressive in France, especially in the *gabelle* or excise on that necessary of life, salt. It is a curious fact, however, that when the farming of the E. was abolished in Scotland by the union, the people grumbled, saying they were easier under the farmers, their own neighbors, who acted on the principle of "live and let live," than under the officers sent down from England, who rigidly collected the impost.

An E. works most easily when it is laid on some commodity banished from domestic production, and created by manufacturers on a large scale. In a great distillery, the excise officer is almost a portion of the establishment, who has an eye on every step of the process, with the view of seeing that the commodity does not get into the market without government obtaining its proper share—sometimes far the greater part—of the market price. The social influence of such an arrangement is very different from that of the old candle and salt duties, which made it the function of the exciseman to pounce on a farmer's family melting the surplus tallow of the last killed sheep, or of a fisherman boiling sea-water to procure salt for his potatoes. The manufacturer, however, though he has the benefit of the bonding system, feels the E. regulations to be a perpetual drag and hindrance in his operations, since there are multitudes of minute operations which he cannot perform without sending special notice to the E. department, or having an officer actually present. This renders it necessary, too, that all the steps of the process should not merely be defined as between the manufacturer and the officer, but should be set forth in an act of parliament; and hence deviations for the purpose of economy, or by way of experiment, become difficult, and sometimes impracticable. As difficulties with which the producer has to contend, these things require him to lay on the selling price of the commodity a larger addition, by reason of the E., than the actual amount of the duty.

No method of taxation requires a nicer adjustment to the social condition of a country than an excise. Thus, in England, in the year 1746, a duty of 20*s.* a gallon was laid on spirits, with the view of suppressing the vice of drunkenness, which, on the other hand, it greatly increased, for the law became a dead letter, and the smuggler fully supplied the market, although within the two years in which the law was in force, no fewer than 12,000 persons were, according to Tindal's history, convicted of offenses against the act. In Scotland, the duty, which was 5*s.* 6*d.* a gallon, had to be reduced in 1823 to 2*s.*, on account of the prevalence of smuggling—half the consumption of the country, in fact, paying no duty. The duty has since then been gradually raised, until it now amounts to 10*s.* a gallon, forming a vast source of revenue. The whole E. revenue of the United Kingdom for 1876–77 amounted to £28,408,000, of which more than three fourths were supplied from the consumption of liquor—viz., £15,346,370 from spirits, and £8,274,645 from malt, and there were besides the license-duties for selling liquors. The productiveness of this great source of revenue, and the expense and annoyance connected with the levying of a duty on other miscellaneous commodities, has led to the gradual removal of many E. duties, as, for instance, on salt, candles, leather, glass, soap, and paper. In 1849, the E. department was amalgamated with that of stamps and taxes to form the board of inland revenue; and while many changes have been made on the articles taxable, the board has been making great changes on the organization of the E. system. The only articles on which E. duties are now charged are spirits, malt, sugar, chicory, race-horses, and the passenger receipts of railway companies. But various taxes of the nature of license-duties for following particular pursuits are collected in the E. department; and to these were added, in 1869, a considerable number of items formerly chargeable as assessed taxes. License-duties must be taken out yearly by auctioneers, appraisers, brewers, maltsters, victuallers, sellers of beer, spirits, and wine, sellers of playing-cards if also makers, hawkers, horse-dealers, house-agents, tobacconists, and dealers in patent medicines. Game-licenses, gun-licenses,

and licenses for male-servants, horses, dogs, carriages, and the use of armorial bearings come under the same department. According to the present organization of the E. department, the United Kingdom is divided into collections, each under a collector; the collections are subdivided into districts, each under a supervisor; and these into divisions, each under division-officers and ride-officers. The efficiency with which these officials discharge their duties secures a very complete payment of taxes, and their manner of dealing with the tax-payers leaves a *minimum* of just ground for complaint.

EX'CITANTS, or STIMULANTS, are those pharmaceutical preparations which, acting through the nervous system, tend to increase the action of the heart and other organs. They all possess more or less of a pungent and acrid taste, and give rise to a sensation of warmth when placed on a tender part of the skin. The class is a very numerous one, and the application of excitants or stimulants to the human subject should always be under the supervision of a qualified medical practitioner.

EXCITO-MOTOR ACTION. See NERVOUS SYSTEM.

EXCLUSION BILL, a proposed measure for excluding the duke of York, afterwards James II., from the succession to the throne, on account of his avowed Catholicism. A bill to this effect passed the commons in 1679, but was thrown out by the upper house. As the new parliament summoned in 1681 seemed determined to revert to this measure, it was dissolved, and Charles ruled henceforth without control. See CHARLES II., JAMES II.

EXCOMMUNICA'TION is exclusion from the fellowship of the Christian church. The ancient Romans had something analogous in the exclusion of persons from the temples and from participation of the sacrifices, which persons were also given over with awful ceremonies to the furies. The Mosaic law decreed E. in case of certain offenses; and the intimate connection of things civil and ecclesiastical under the Jewish polity, rendered it terrible even as a temporal punishment. The Jews, in practice, had three degrees of excommunication. The first, *niddui*, was an exclusion from the synagogue for thirty days, that the offender might be ashamed. The second, *cherem*, was also for thirty days, but, besides exclusion from the synagogue, carried with it a prohibition to all other Jews of any intercourse with the individual, and was often proclaimed with sound of trumpet. The third, *shammatha* or *anathema maranatha* (see 1 Cor. xvi. 22), was exclusion from the synagogue and privileges of the Jewish church for life, with loss of civil rights, and was accompanied with terrible curses, in which the offender was given over to the judgment of God. In the Christian church, E. has in all ages been practiced, as indeed every society must necessarily have the power of excluding unworthy members and those who refuse to comply with its rules, and the New Testament plainly recognizes and establishes this right in the church. But two different degrees of E. were soon distinguished—the first or lesser, a mere exclusion from the Lord's table and from other privileges of members of the church; the second or greater, pronounced upon obstinate offenders and persons who departed from orthodox doctrine, more solemn and awful, and not so easily capable of being revoked. Penances and public professions of repentance were required; and in Africa and Spain, the absolution of *lapsed* persons (i.e., those who in time of persecution had yielded to the force of temptation, and fallen away from their Christian profession by the crime of actual sacrifice to idols) was forbidden, except at the hour of death, or in cases where martyrs interceded for them. But for a long time, no civil consequences were connected with excommunication. Afterwards, the greater E. was accompanied with loss of political rights, and exclusion from public offices. The power of E. also, which had been at first in the church as a body, gradually passed into the hands of the bishops, and more especially of the popes, who did not scruple to exercise it against entire communities at once. The *capitularies* of Pepin the less, in the 8th c., ordained that the greater E. should be followed by banishment from the country. The Roman Catholic church pronounces the sentence of E. with many circumstances of terrible solemnity, and it contains a prohibition to all Christian persons of all intercourse with the person excommunicated, and of extending to him even the most ordinary social offices. The latest "examples" made by the pope were Napoleon I. in 1809, and Victor Emmanual, king of Italy, in 1860; neither of whom, however, was excommunicated by name, the pope having confined himself to a solemn and reiterated publication of the penalties decreed by his predecessors against those who unjustly invaded the territories of the holy see, usurped or violated its rights, or violently impeded their free exercise. Pope Innocent III., in the Lateran council (1215), declared that E. put an end to all civil rights and dignities, and to the possession of any property. The E. of a sovereign was regarded as freeing subjects from their allegiance, and in the year 1102, this sentence was pronounced against the emperor Henry IV., an example which subsequent popes likewise ventured to follow. But the fearful weapons with which the popes armed themselves in this power of E., were rendered much less effective through their incautious employment, the evident worldly motives by which it was sometimes governed, and the excommunications which rival popes hurled against each other during the time of the great papal schism. The Greek church also makes use of E., and every year at Constantinople, on a certain Sunday, the greater ban is pronounced against the Roman Catholic church.—The reformers retained only

that power of E. which appeared to them to be inherent in the constitution of the Christian society, and to be sanctioned by the word of God; nor have any civil consequences been generally connected with it in Protestant countries. To connect such consequences with E. in any measure whatever, is certainly inconsistent with the principles of the reformation. Nevertheless, in England, until the 53d of Geo. III. c. 127, and in Ireland, until the 54th, c. 68, persons excommunicated were debarred from bringing or maintaining actions, from serving as jurymen, from appearing as witnesses in any cause, and from practicing as attorneys in any of the courts of the realm. All these disabilities were removed by the statutes above named; and the excommunicated were declared no longer liable to any penalty, except "such imprisonment, not exceeding six months, as the court pronouncing or declaring such person excommunicate shall direct."

In the Roman Catholic church, the power of excommunicating is held to reside, not in the congregation, but in the bishop; and this is believed to be in exact accordance with the remarkable proceeding commemorated in the First Epistle of St. Paul to the Corinthians (1 Cor. v. 3–5), and with all the earliest recorded examples of its exercise. Like all the other powers of the episcopate, it is held to belong, in an especial and eminent degree, to the Roman bishop as primate of the church; but it is by no means believed to belong to him exclusively, nor has such exclusive right ever been claimed by the bishops of Rome. On the contrary, bishops within their sees, archbishops while exercising visatatorial jurisdiction, heads of religious orders within their own communities, all possess the power to issue E., not only by the ancient law of the church, but also by the most modern discipline. As to the prohibition of intercourse with the excommunicated, a wide distinction is made between those who are called "tolerated" and those who are "not tolerated." Only in the case of the latter (a case extremely rare, and confined to heresiarchs, and other signal offenders against the faith or public order of the church) is the ancient and scriptural prohibition of intercourse enforced. With the "tolerated," since the celebrated decree of pope Martin V. in the council of Constance, the faithful are permitted to maintain the ordinary intercourse. It is a mistake, likewise, to ascribe to Catholics the doctrine "that excommunication may be pronounced against the dead." The contrary is expressly laid down by all canonists (Liguori, *Theologia Moralis*, lib. vii. n. 13, 1). In the cases in which this is said to have been done, the supposed "excommunication of the dead" was merely a declaration that the deceased individual had, *while living*, been guilty of some crime to which *excommunication is attached by the church laws*. Catholic writers, moreover, explain that the civil effects of E. in the mediæval period—such as incapacity to exercise political rights, and even forfeiture of the allegiance of subjects—were annexed thereunto by the civil law itself, or at least by a common international understanding in that age. Examples are alleged in the law of Spain, as laid down in the sixth council of Toledo—a mixed civil and ecclesiastical congress—(638); in the law of France, as admitted by Charles le Chauve (859); in the Saxon and in the Swabian codes, and even in the English laws of Edward the confessor; all which, and many similar laws, proceed on the great general principle of these mediæval monarchies, viz., that orthodoxy and communion with the holy see were a necessary condition of the tenure of supreme civil power; just as by the 1 Will. and Mary, s. 2, c. 2, profession of Protestantism is made the condition of succession to the throne of England. Hence, it is argued, the mediæval popes, in excommunicating sovereigns and declaring their subjects released from allegiance, did but declare what was, by the public law of the period, the *civil* effect of the exercise of what in them was a *spiritual* authority.

By the discipline of the Roman Catholic church, kings or queens, and their children, are not included in any general sentence of E., unless they be specially named.

EXCRETION. See SECRETION.

EXCULPA'TION, LETTERS OF, in the law of Scotland, are the warrants granted to the accused party, or panel as he is called, in a criminal prosecution, to enable him to cite and compel the attendance of such witnesses as he may judge necessary for his defense. These letters are issued as a matter of course, on application at the justiciary office, if the prosecution be in the high court, or to the sheriff clerk in cases of sheriff court libels. If there be any special defense, such as *alibi*, a written statement of its nature, along with the articles to be founded on, and a list of the witnesses to be called, must be lodged with the clerk of court the day before the trial.

EXE, a river of the s.w. of England, rises in Exmoor, in the w. of Somersetshire, and flows 19 m. s.e. to the borders of Devonshire, and then 35 m. s. through the e. part of that co. into the English channel at Exmouth. The lower 5 m. form a tideway a mile broad at high water, with wooded and picturesque shores, and navigable for large vessels. The chief tributaries are the Barle, which is 24 m. long, Batham, Loman, Culm, and Creedy. The E. passes Dulverton, Brompton, Exeter, and Topsham. It has a clear and merry current through wooded and romantic vales.

EXECUTION, in the law of Scotland, signifies the attestation by a messenger-at-arms (q.v.), or other officer of the law, that he has given a citation, or carried through a diligence (q.v.), in terms of the warrant of the judge. It corresponds to an affidavit of service of writ or summons in the common law courts, and of a bill or claim in chan-

cery. Executions must be subscribed by the messenger or other executor, and by one or two witnesses; and where the execution consists of more pages than one, each page, or at least each leaf, must be so attested. The witnesses are witnesses to the fact of service, not merely to the subscription of the messenger; and the execution ought strictly to bear that they are witnesses to the premises. Till the passing of recent acts (1 and 2 Vict. c. 114, etc.; see EVIDENCE), two witnesses were necessary to all executions, but one is now sufficient, except in cases of poinding, where two are still required. (Bell's *Law Dictionary*, and authorities cited.)

EXECUTION, CRIMINAL. See CAPITAL PUNISHMENT.

EXECUTION, MILITARY AND NAVAL, usually takes place by hanging or shooting, according to the rank of the offender and the nature of the offense. In some rare instances, blowing from the mouth of a gun has been resorted to. For particulars of the acts for which death is awarded, see PUNISHMENTS, MILITARY AND NAVAL, and MUTINY ACT.

EXECUTION ON CIVIL PROCESS is the method whereby the English high court enforces its judgment on the person or estate of those against whom judgment has been given. The common law of England allows four different writs to issue against refractory debtors—viz., a *fieri facias* (called commonly a *fi. fa.*), a *capias ad satisfaciendum* (*ca. sa.*), *levari facias*, and *elegit*. These writs issue from the court of the division in which the proceedings are grounded, and are addressed to the sheriff of the county. By a *fi. fa.* the goods and chattels of a debtor may be attached. This writ lies against all proprietors, peers, etc. A writ of *ca. sa.* is directed against the person of a debtor. It does not lie against privileged persons. Under this writ, the sheriff may imprison a debtor, and detain him until the debt has been satisfied. A writ so stringent in its effect is regarded by the law as the last remedy; hence, when a *ca. sa.* has been issued, no other writ can proceed against the debtor. But if a *fi. fa.* has been first issued for a part of the debt, a *ca. sa.* will still lie for the remainder. By recent statutes, a *ca. sa.* cannot be issued to imprison for debt unless fraud was involved. A *levari facias* is now seldom used. It is directed against a man's goods and the profits of his lands. The writ of *elegit* is of very ancient date. It is directed against the lands themselves. See ELEGIT. In the chancery division of court, *execution* against the estate is effected by writ of *fieri facias*, or writ of *elegit*. Execution against the person is by writ of attachment. Should this latter writ be returned *non est inventus*, the party prosecuting has it in his option to take out a writ of sequestration of the estate, with issues of course, or to obtain an order for the sergeant-at-arms. An attachment does not lie against a peer or other privileged person, but an order called a sequestration *nisi* is issued. In cases of contempt, the high court in each division has also the power to order personal commitment. In all cases execution may issue immediately, each writ being renewable after a year, within six years; but the court or judge can stay execution to a time fixed —or subject to conditions.

Execution for debt in Scotland, or, as it is technically expressed, diligence in execution, is either real or personal: by the former, the debtor's lands may be attached; by the latter, his person and his movables. In order to entitle a creditor to use diligence against the person or estate of his debtor, the debt on which the diligence proceeds must be duly constituted by a liquid document, or by a decree, or by an action in which decree is sought. In this latter case, the law in peculiar circumstances allows diligence on the dependance, in order that a party may not be deprived of his remedy during the currency of the action, but such diligence depends for its effect upon the judgment in the cause. In the case of bonds and other instruments registered for execution (see REGISTRATION), the law allows summary diligence to proceed; that is to say, execution may proceed without the need of further application to the court. Diligence against heritage includes INHIBITION, ADJUDICATION, RANKING AND SALE, POINDING OF THE GROUND. Personal diligence is by HORNING AND CAPTION, ARRESTMENT, and FORTHCOMING. See these several heads.

EXECUTION ON CIVIL PROCESS (*ante*), the writ which directs and authorizes the officer to carry into effect the final judgment or decree of a court upon the person or estate against whom judgment has been given. It is usually, though not always, a writ for the recovery of money for debt or damages out of the estate of a defendant. Sometimes it is a writ for a defendant upon a judgment in replevin, for a return of goods with damages; and sometimes a writ for the recovery of costs only. An execution on civil process may be taken out as soon as judgment is pronounced, even before it is recorded. The execution, unless otherwise specially provided by statute, or unless a writ of error or some agreement of the parties be interposed, must be taken out within a year and a day from the time the judgment was signed. After that time execution cannot issue unless a *fieri facias*, or *capias ad satisfaciendum*, was previously sued out. The writ is directed to the sheriff, or in case of his disqualification by interest or otherwise, to the coroner, who becomes responsible for its execution, and is liable for damages if he neglect his duty. He is authorized to sell the personal property of the defendant at auction, and apply the proceeds to the satisfaction of the judgment and the costs and charges of the proceedings; and if there be a surplus, it must be paid to the defendant. In general, lands are not subject to execution; but, after a levy has

been made under the *fieri facias*, they must be appraised by the sheriff's jury and delivered to the plaintiff at the valuation until the debt is paid out of the profits. Exemption is made of certain property from execution for debt, as, for instance, household furniture, necessary provisions and fuel for the use of the family, necessary wearing apparel, bedding, tools of trade, books, pictures, etc., and a homestead of a certain value. The laws of the several states in respect to such exemptions are not uniform in all particulars.

EXECUTION OF CRIMINALS. See CAPITAL PUNISHMENT. Executions took place publicly in the United Kingdom till 1860, when it was by an act of parliament made law that all executions should take place within the precincts of a prison, in the sight of certain officials, newspaper reporters, and others invited to be present. The United States, Bavaria, and the colony of Victoria had previously adopted this method. The lack of that terror with which public executions were supposed to strike the multitude is, by this private mode of procedure, held to be more than compensated by the prevention of what was a brutalizing public spectacle. In London, executions took place for the most part at Tyburn until 1783, when a scaffold erected in front of Newgate prison became the common place of execution. "The gallows was built with three cross-beams for as many rows of sufferers; and between Feb. and Dec., 1785, ninety-six persons suffered by the 'new drop,' substituted for the cart. About 1786, here was the last execution, followed by burning the body; when a woman was hung on a low gibbet, and life being extinct, fagots were piled around her and over her head, fire was set to the pile, and the corpse burned to ashes. On one occasion the old mode of execution was renewed: a triangular gallows was set up in the road opposite Green-Arbor court, and the cart was drawn from under the criminal's feet."—Timb's *Curiosities of London*. To render executions more impressive, they were in some cases ordered to take place near the scene of guilt. About forty years ago, two men were hanged at Bishopbriggs, near Glasgow, in sight of the scene of a murder they had committed. The ordinary place of execution in most towns in Great Britain and Ireland is outside the prison. At Edinburgh, executions took place chiefly in the Grassmarket, until 1784, when they were transferred to a platform at the w. end of the Tolbooth, a building removed in 1817. The interval between sentence and execution is about three weeks, the nature of the crime not making any difference in this respect. In all parts of the British empire, the convict under sentence of death is allowed to make choice of the spiritual adviser who shall attend on him; and generally, everything that humanity can suggest is done to assuage the bitterness of his fate. At one time, the bodies of murderers after execution were, in terms of their sentence, delivered to professors of anatomy for dissection; and it would appear that in some instances the mangled corpse was made a kind of public show. Such took place on the execution of earl Ferrers, 1760. The body having been conveyed from Tyburn in his lordship's landau-and-six to Surgeon's hall, was, after being disemboweled and laid open in the neck and breast, exposed to public view in a first-floor room. A print of the time depicts this odious exhibition. The ordering of the bodies to be dissected, having led to great abuse, was abolished in 1832; since this period, the bodies of executed murderers are buried within the precincts of the prison, and the bodies of other malefactors are given to their friends. See ANATOMY (in law). It was also at one time customary to hang the bodies of certain malefactors in chains after execution—as, for example, the bodies of pirates were so hung on the banks of the Thames—but this usage, revolting to public feeling, is likewise abandoned. From the improved state of the criminal law, death-sentences are now of comparatively rare occurrence, and still more rarely are such sentences executed, for, except in cases of deliberate and aggravated murder, the extreme sentence of the law is now usually commuted by the crown into penal servitude for life. The secretary of state for the home department, however, exercises his power in this respect with much care and discretion; and the element of arbitrariness, which might be supposed to spring from differences of temper in different home secretaries, is very seldom obvious.

A great change took place in the public attendance at executions before they were discontinued. Formerly, persons belonging to the higher and middle ranks were habitually present at these dismal exhibitions; many hiring windows at a considerable sum for the occasion. Literature furnishes us with various instances of persons of cultivated mind attending regularly from a morbid love of the spectacle. George Selwyn was fond of seeing executions. His friend Gilly Williams, writing to him of the condemnation of John Wesket (Jan. 9, 1765) for robbing the house of his master, the earl of Harrington, says: "Harrington's porter was condemned yesterday. Cadogan and I have already bespoke places at the Brazier's. I presume we shall have your honor's company, if your stomach is not too squeamish for a single swim."—Selwyn's *Correspondence*, vol. i. p. 323. The earl of Carlisle, writing to Selwyn, speaks of having attended the execution of Hackman, a murderer, April 19, 1779.—*Ibid.*, vol. iv. p. 35. James Boswell, the biographer of Johnson, had a passion for seeing executions, and even for accompanying criminals to the gallows. He was indulged with a seat in the mourning coach to Tyburn, along with the above-named Hackman, the ordinary of Newgate, and sheriff's officer. Visiting Johnson on the 23d of June, 1784, he mentions

that he has just come from the shocking sight of fifteen men hanged at Newgate. Boswell's *Johnson*, vol. viii. p. 331, Croker's edition. At public executions there were to the last considerable crowds, but they consisted chiefly of the lowest of the population. During the excesses of the French revolution, the executions in Paris were enjoyed as a spectacle by crowds of female Jacobins. From the circumstance of these furies employing themselves with knitting needles while attending daily at the scaffold, they became familiarly known as the *tricoteuses* (knitters). Some further information concerning executions will be found in DROWNING, GUILLOTINE, HANGING, MAIDEN, NEWGATE, PARRICIDE, PEINE FORTE ET DURE, PRESSING TO DEATH, TYBURN, AND WHEEL (BREAKING ON THE).

EXECUTION OF DEED, the performance of the ceremonies required by law in order to make a deed binding and effectual. These ceremonies in England consist in signing, sealing, and delivering. According to the ancient common law of England, signature was not necessary to a deed. By 29 Car. II. c. 3 (statute of frauds), signing was required for almost all deeds. But it is still a question which has not been positively decided whether, when a seal is used, it is necessary that the parties should sign. When a party, from any cause, is unable to write, it is usual for him to place his mark in the place of signature. But a mark is unnecessary, and signature by another, at request of the party, is enough. Sealing is the most ancient form of authentication of deeds. In England, deeds are technically known as deeds under seal. A seal is absolutely essential to the validity of an English deed, but any species of seal is sufficient, and in practice a common wafer is usually appended. Delivery is the third requisite to authenticate a deed. Delivery may be made either to the grantee or to another person for him. In the former case, the deed becomes absolute; in the latter, it is called an *escrow*, and does not acquire its full effect till the conditions are fulfilled. Witnesses are not absolutely required to a deed in England, but in practice it is usual that one witness should attest. Before execution, a deed must be read, if required, by a party to it; and if not read, it is void as to the party requesting. Where a person is ordered in chancery to execute a deed or other instrument, and is in prison for failure to comply with the order, the court may make an order that the instrument be executed by the officer of the court; and the execution having been so made, the instrument is equally valid as if signed by the party. The execution of wills in England is regulated by 7 Will. IV. and 1 Vict. c. 26. By this statute it is required that every will shall be signed at the foot or end by the testator in presence of two witnesses. See WILL.

In Scotland, sealing was formerly an essential requisite for execution; but that practice was by 1584 c. 4 dispensed with in regard to registered deeds, and has long fallen into disuse. The solemnities of execution are now regulated by the old acts 1540 c. 117, and 1681 c. 5. By the former of these acts, the signature of the maker of the deed is required, and by the latter, the presence of two witnesses is made essential. In order to a valid execution of a deed or will in Scotland, it is necessary that the maker should sign in the presence of two witnesses, or should in their presence acknowledge his signature, and that the witnesses should then sign their own names, writing after them the word "witness." In case the maker of the deed cannot write, the deed is signed in his presence by two notaries, in presence of four witnesses. But in case of a will, one notary and two witnesses are sufficient. A deed thus witnessed is received as conclusive proof of the facts against the maker. Subscription by initials has been permitted in Scotland. But this mode of execution is irregular, and where it has been adopted, proof has been required that *de facto* the signature was so made. There is one exception to the rule that witnesses must attest the signature—viz., that of a deed or other instrument the whole, or the essential parts of which are holograph, i.e., in the testator's handwriting, being valid without witnesses. Bills and promissory notes, receipts, and mercantile accounts do not require to be holograph or attested.

EXECUTION OF DEED (*ante*). A deed is executed when it is signed, sealed, and delivered; but to make it good against a subsequent purchaser it must be acknowledged before a magistrate and recorded by the officer appointed for that purpose. In some states two witnesses to a deed are required; in others, one witness is sufficient; in others still, the acknowledgment before a magistrate makes any witness unnecessary.

EXECUTIONER, the official who inflicts capital punishment. In England, it is the province of the sheriff to perform this as well as every other ministerial duty enjoined by the criminal courts, but practically he acts by his servants or officers, and he only attends to see the law properly carried out. In royal burghs in Scotland, this duty is imposed on the civic magistracy, one of whom attends for the purpose. In times happily bygone, so numerous were the public executions, that almost every county and town had its E., as an acknowledged officer of justice, with a salary for his subsistence. Yet, we learn that on certain occasions, so odious and so onerous was the duty to be performed, that a special E. was employed. Such was the case at the execution of Charles I.* The task of putting this unfortunate monarch to death is well known to have been performed by two men, who, from a dread probably of the vengence of the royalists, had concealed their faces under visors. In consequence of the mystery thus assumed, public curiosity was much excited, and several persons fell under the suspicion of having been concerned in the bloody deed; rumor even went so far as to

decide who was the wielder of the ax, and who held up the head. It cannot be said, however, that any certainty was ever arrived at on the subject. See *Chambers's Edinburgh Journal*, first series, vol. iv. p. 317.

Like many other offices, that of E. seems to have been at one time hereditary in England. Shakespeare, in *Coriolanus* (act ii. scene 1), makes "Menenius," one of the characters in the play, speak of "hereditary hangmen." In several German states, the office of headsman (q.v.) is said to have been also hereditary; certain families being thus, as it were, condemned to perpetual infamy. The last headsman of the Tower of London died in 1861. The office was latterly a mere sinecure, and has not been filled up. In some parts of England the office was annexed to other posts; for instance, the porter of the city of Canterbury was E. for the co. of Kent, in the time of Henry II. and Henry III., for which he had an allowance of 20*s.* per annum from the sheriff, who was reimbursed by the exchequer. The sum of thirteenpence-halfpenny was long popularly spoken of as "hangman's wages;" such sum, equal to a merk Scots, being the fee at one time paid to the E. when he officiated. In the 17th c., this sum, small as it now appears, was considerably above the wages of a skilled mechanic.

From Gregory Brandon, the London E. in the reign of James I., the name Gregory was employed as a familiar designation for executioners for a considerable period. Brandon had the address to procure a coat-armorial from the college of heralds, and became an esquire by virtue of his office. One of his successors was named Dun, or "Squire Dun," as he was called. Dun is referred to in Butler's *Ghost*, published in 1682:

> For you yourself to act "Squire Dun,"
> Such ignominy ne'er saw the sun.

He was succeeded about the above year by John or Jack Ketch, commemorated by Dryden (*Epilogue to the Duke of Guise*), and his name has since been synonymous with hangman.—Cunningham's *Handbook of London*, article Tyburn.

Executioners have, in some instances, come to trouble. John Price, the London E., was executed 31st May, 1718, for murder. In the account of him, it is stated that one day, on returning from Tyburn, he was arrested for a debt, which he discharged by a small sum in his pocket, along with the proceeds of the clothes of three felons he had just executed.—*Old Bailey Chronicle*, i. p. 147. If this work can be credited, the E. was about the same time arrested while accompanying John Meff, a criminal, to Tyburn. This arrest, which is amusingly depicted in an engraving, stayed the execution of Meff; being conducted back to Newgate, his sentence was commuted to transportation for 7 years, but having returned to England before the period expired, he was taken and executed. On the 24th May, 1736, the E., on returning from Tyburn, after executing five felons, picked the pocket of a woman of 3*s.* 6*d.* (Hone's *Every-Day Book*, ii. p. 695), but what was his punishment is not related. In 1682, Alexander Cockburn, hangman of Edinburgh, was executed for the murder of a bedesman, or privileged mendicant. Early in the 18th c., the E. of Edinburgh was John Dalgliesh, who acted at the execution of Wilson the smuggler in 1736, and is alluded to in the *Heart of Mid-Lothian*. It was he who also officiated at the execution of the celebrated Maggie Dickson, a woman condemned in 1738 for infanticide, but who came to life again after enduring the sentence of the law, and lived unmolested for years afterwards, as a hawker of salt in the streets of Edinburgh. It is said of Dalgliesh, that, in whipping a criminal, he made a point of laying on the lash "according to his conscience," which showed him to have been a most considerate executioner. John High, or Heich, accepted the office of Edinburgh E. in 1784, in order to escape punishment for stealing poultry; he died in 1817. See *Traditions of Edinburgh*, by R. Chambers. The emoluments of the Edinburgh E. at one time comprehended a recompense in kind in the markets of the city—viz., a *lock* or handful, and a *gowpen* or double handful, of meal from each sack; hence he received the designation of *lockman*. These emoluments were latterly commuted into a regular salary of 12*s.* per week, besides a free house, and a special fee of £1 11*s.* 6*d.* at each execution; from the exchequer the E. also received a small annual allowance as deemster (q.v.). The last of the Edinburgh executioners was John Scott, whom it was customary to confine in jail for 8 days previous to an execution, in order to insure his attendance; the expenses incurred by him during one of these periods of seclusion being, as we find, £1 2*s.* 6*d.*, which sum was discharged by the city. Scott was killed by a malicious assault in 1847. Since this period, Edinburgh has had no regular hangman, but, like all other places in Great Britain, depends on the London E., who is hired for the occasion. This personage, until lately, was the well-known William Calcraft. For an execution at Edinburgh in 1854, Calcraft's fee and expenses amounted to £33 14*s.*; his assistant received £5 5*s.*; and for taking charge of both, the city criminal officers were paid £1 1*s.*: total expenses for the execution, £40, independently of the cost of erecting the scaffold. In 1815, the magistrates of Glasgow entered into an arrangement by stamped indenture with Thomas Young, who engaged to act as E. at a recompense of £1 per week, a free house, with coal and candles, a pair of shoes and stockings once a year, and a fee of a guinea at each execution. At Young's death in 1837, his successor, John Murdoch, was recompensed differently He was paid £1 per month, by way of retainer, and the sum of £10 for an execution. After his death, Calcraft officiated, he in turn having been succeeded by Marwood. Besides the usual fees, execu-

tioners have from early times claimed the clothes of those who suffer, as a perquisite of office. See PERQUISITE.

The most noted E. of Paris was the late M. Sanson, who officiated at the mournful death-scene of Louis XVI., and is said to have possessed acquirements and feelings not to be expected from one of his degrading profession. He was latterly assisted by his son, M. Henri Sanson. See *Memoirs of the Sansons* (1875). The Parisian E. is familiarly styled "Monsieur de Paris."

No professional E. is employed at capital punishments in the United States. There the sentence is executed by the sheriff, with the assistance of an under-jailer; this last official performing the fatal toilet of the criminal, while the sheriff, by a movement affecting the drop, puts him to death in virtue of the sentence and the law of the state. This seems an advance on the practice in England, where, however, it could not be introduced, for the simple reason that no one fit for the rank of sheriff or magistrate would accept of office with an obligation to perform the duty of E. in prison. The military E. attached to an army is styled provost-marshal (q.v.).

EXECUTIVE. See GOVERNMENT.

EXECUTIVE DEPARTMENT, the branch of the government to which is confided the duty of executing the laws; in distinction from the legislative department which enacts, and the judicial department which expounds them. In the U. S. government, the chief executive officer is the president; in the several states, the governors thereof. The secretaries of state, treasury, interior, war, and the navy, with the postmaster-general, and the attorney-general, are officers of the executive department under direction of the president. The law does not oblige him to consult them, but the custom has made them his counselors and advisers. In the different departments are numerous subordinate executive officers, known as assistant-secretaries, clerks, examiners, solicitors, auditors, controllers, commissioners, deputy-commissioners, directors, chiefs, superintendents, etc. There are also collectors of internal revenue (in districts), and collectors and surveyors of customs (in districts).

EXECUTOR, IN ENGLAND, the person to whom the execution of a last will and testament of personal estate is by testamentary appointment confided (Williams on *Executors*, 197). The appointing by will of an E., without giving any legacy or appointing anything to be done by him, is sufficient to make a will. The appointment of an E. can only be by a will, the person who takes charge of the estate of an intestate being called an administrator (q.v.). The appointment may be either express or constructive, i.e., gathered from the general terms of the will. An early duty of an E. is to take probate (q.v.) of the will. He derives his title solely from the will; the estate vests in him from the death of the testator, at which time his responsibility begins, and from which time he may enter upon all the duties of managing the estate. But his position will not be recognized as suitor in any court until he has taken probate. The whole personal estate vests in the E., and if the testator has made no disposition of the residue, it devolves, by common law and equity, upon the executor. The court, in some cases only, will endeavor so far to carry out the intentions of the testator as not to give the beneficial interest to the E., where there appears from the will a necessary implication that he should not receive it. By 21 Henry VIII. c. 5, an E. is bound to prepare an inventory of the personal estate. This, if required, must be produced. An E. may raise actions in respect to the estate in his charge; and generally it may be said that his powers, duties, and liabilities are commensurate with those of the deceased. He may enter the house of the deceased to remove the personal property. The first claims to be discharged are those of the funeral and the expenses of probate. He must then pay the debts; and he is responsible for paying them in due order, so that those having a legal preference shall first be discharged. An E. is not bound to accept the office; but if he administer, he cannot then renounce the executorship without cause. On the death of an E. the office does not pass to his executor.

An E. to a will in Scotland is called a testamentary E., to distinguish him from the next of kin, who are styled executors. The term E. is given to all who manage the estate of a deceased, whether appointed by will or by authority of the court. The former are called executors nominate; the latter, executors dative. All executors must, before entering upon their duties, obtain *confirmation* (q.v.) from the commissary court. This is equivalent to probate in England. But in Scotland, no right vests in the E. until after confirmation, except a title to sue, being exactly the reverse of the English rule. An E. acting without confirmation is called a *vitious intromitter* (q.v.). Executors must, on entering upon their office, exhibit a full inventory of the whole movable estate of the deceased. An E. is only liable to the extent of the inventory. He is not bound to pay interest on the funds in his hands unless they bore interest before confirmation, or unless he is guilty of undue delay in administering the estate. He is not bound to pay the debts for six months after the death of the deceased. But, as in England, the expenses of the funeral and confirmation are entitled to immediate payment. Servants' wages and a year's house-rent have also a preferable claim. An E. is entitled to claim one third of the *dead's part* (q.v.), after deducting debts. But should he receive a legacy, he is bound to impute that towards payment of his claim.

EXECUTOR (*ante*), a person to whom another man has committed the execution of his last will and testament. He may decline to act if he choose, in which case the court will appoint an administrator. But if he accept and enter upon the trust he cannot resign it without reason. In general, any person capable of making a contract may be an executor. His duties are to bury the deceased in a manner suitable to the estate left behind, to prove the will, take possession of the property of the testator, make an inventory of the same, collect the assets, and pay the debts and legacies. For this the law gives him all the powers of the testator. Generally an executor is required to give bonds for the faithful discharge of his duties.

EXECUTORS, in Scotland, the heirs *in mobilibus* of a person deceased. They are the whole next of kin in the nearest degree in blood; but where the heir to the heritage is one of the nearest of kin (e.g., the oldest son), he is not entitled to share in the movables without collation (q.v.). The order of succession among executors is first descendants, then collaterals, or brothers and sisters, and their children; and, lastly, ascendants, i.e., the father and those claiming through him. But the mother and her family, till recently, were not allowed to succeed to her own child *ab intestato*. This harsh rule was so strictly carried out, that where there were no relations by the father, the crown succeeded as *ultimus hæres*, to the exclusion of the mother.

By 18 Vict. c. 23, the law of succession to movables has been in some degree altered. On the death of an intestate leaving no issue, his father, if he survive, is entitled to take one-half of the movable estate, in preference to brothers and sisters. If the father be dead, the mother takes a third. No further provision, however, is made for the mother in case she is the only surviving relative. The result is, therefore, that the other two-thirds would still go to the crown. See SUCCESSION, MOVABLES.

EXECUTORY DEVISE, in English law, is such a limitation of a future estate or interest in lands or chattels (though in the case of chattels it is more properly a bequest) as the law admits in the case of a will, though contrary to the rules of limitation in conveyances at common law (Blackstone, *Comm.* ii. 334). By common law, a freehold cannot be limited on a freehold, as an estate to A and his heirs; but if he die before he attain the age of 21, then to B and his heirs. Nor can an estate be given to commence at a time uncertain, as to A when he returns from Rome. But though these limitations would be void in a deed, common law will sustain them as executory devises. This form of limitation is restrained by the law against perpetuities (q.v.), which requires that the estate must take effect within a life or lives in being and 21 years after. The law will not interpret a limitation as an E. D., if it can be otherwise sustained. Whenever, therefore, a future interest in land is so devised as to fall within the rules laid down for the limitation of contingent remainders, such devise will be construed as a contingent remainder, and not as an executory devise (Cruise, *Digest*, vi. 369). An E. D., unlike a remainder, cannot be defeated by any act of the first taker or devisee; when, therefore, an absolute power of disposition is in the first taker, the limitation over is not an executory devise. Within the period allowed for these estates, an E. D. constitutes a species of estate tail; and for this purpose, it is frequently used in America.

EXEGE'SIS (from Gr. *ek*, out of, and *ēgeomai*, I lead) properly signifies the exposition or interpretation of any writings, but is almost exclusively employed in connection with the interpretation of sacred Scripture, to which, therefore, the subjoined remarks specially apply. The expositor or interpreter is called an *exegete*. To interpret a writing, means to ascertain thoroughly and fundamentally what are the conceptions and thoughts which the author designs to express by the words he has used. For this purpose, it is necessary, in regard to books written in a foreign language, that the exegete should know well, first, the precise signification of the words and idioms employed by the writer. This is termed *grammatico-philological* exegesis. In the next place, he must be acquainted with the things denoted by these words, and also with the history, antiquities, and modes of thought of the nation. This is termed *historico-antiquarian* exegesis. Both together constitute *grammatico-historical* exegesis. When only an exposition of the system of thought contained in a writing is sought after, this is termed *doctrinal* or *dogmatic* E.; while the investigation of a secret sense, other than that literally conveyed by the words of a writing, is termed *allegorical* exegesis. But if a writing is regarded from a practical point of view, and in reference to its bearing upon life and manners, the exposition is termed *moral* exegesis. The complete and coherent E. of a writing forms what is called a *commentary*, but, if restricted to certain difficult words or knotty points, the elucidations are termed *scholia*. The scientific exhibition of the rules and means of E. is called *hermeneutics* (q.v.). In the earliest ages of the Christian church, the allegorical method of E. prevailed. By the Alexandrian school in particular, it was greatly abused. Origen, however, the greatest of this school, deserves high credit for endeavoring to secure a basis for grammatical E., by a sharp separation of the literal, the moral, and the mystical sense of Scripture. Besides the Alexandrian school, the Syrian historico-exegetic school had many adherents in the east. Among these may be mentioned Cyril of Jerusalem, Ephraem Syrus, John Chrysostom, and Theodorus of Mopsuestia. First, towards the end of the 4th, and during the 5th centuries, a narrowing of the principle of the free interpretation of Scripture begins to be

observable, through the rapid development of monkery and the hierarchical system; in consequence of which, the importance of the classic writers was undervalued, and the study of them ultimately abandoned in the western church, while a feeling of superstitious reverence, wholly unintelligent and unscriptural, grew up for the letter of the "Word," and E., if employed at all, was employed simply to bolster up preconceived views. By and by, independent E. was supplanted by the well-known *Catenæ*, consisting of expositions of books of Scripture strung together from the writings of the older church fathers. In the east, the first of these was got up by Procopius, 520 A.D.; in the west, by Primasius, 550 A.D. Although much was done for the E. of the Old Testament by eminent Jewish scholars, such as Solomon. Jarchi, Aben-Esra, and David Kimchi, Christian theologians for the most part, knowing only the text of the Vulgate, stuck, during the dark ages, to the interpretations of the fathers. First in the 12th, 13th, and 14th centuries, efforts were made by individual scholastics, especially by Abelard, St. Bernard of Clairvaux, Thomas Aquinas, and Nicholas of Lyra, to reintroduce something like a grammatico-historical E. of Scripture. But it was mainly to the great revival of letters in the 15th c., and the humanistic scholars whom it produced, such as Laurentius Valla, Erasmus, etc., that an advance in E. was owing. The Complutensian polyglott also exercised a great and beneficial influence. Shortly after, the reformation gave an impulse to E., so powerful, that it is felt at the present day; and, indeed, its effect is far more visible in the recent biblical criticism of Germany than it was in the days of Luther himself. The desire for the unfettered E. of Scripture strongly animated the reformers, but, in fact, the long black night of ignorance—known as the dark and middle ages—has influenced them too, and disqualified them for framing at once a comprehensive exegetical science. It required a couple of centuries to recover from the effects of mediæval ignorance. The more important Lutheran exegetes are Luther, Melanchthon, Brenz, Joach. Camerarius, Strigel, Chemnitz, etc.; of the reformed or Calvinistic school may be mentioned Calvin, Zwingli, Œcolampadius, Bucer, Beza, Bullinger, Grotius, Clericus, etc.; and of the Roman Catholics, especially Paul Sarpi. During the 17th c., the E. of Scripture was for the most part at a stand still, but about the middle of the 18th c. it suddenly revived. This revival was due principally to Joh. Aug. Ernesti (q.v.), and J. Sal. Semler (q.v.), who established new principles of criticism and hermeneutics, through which grammatico-historical E. once more began to make its appearance. The labors of Wetstein and Kennicott in regard to biblical MSS. were of immense service. Since their day, on to the present, criticism has been constantly at work on the writings of the Old and New Testament. Cognate languages have been more and more profoundly studied; the antiquities of the east, of Egypt, Assyria, Arabia, and other countries, have been investigated, and brought to bear on the subject; the manners and customs which prevail in these lands, and which, in some of them, have prevailed from time immemorial; the laws that determine the growth of civilization in nations, and enable us to enter into and comprehend the condition of mind peculiar to races in a primitive stage of development, and to appreciate their modes of thought, and to weigh the value of their literary and religious records—all these have received, and are still receiving careful attention at the hands of numerous scholars, so that it is not too much to say that we are at the present day better fitted—so far as outward helps go—to understand the real meaning of Scripture, than those who have lived at any other period subsequent to its composition. Among the eminent names in the recent development of biblical E. are F. A. Wolf, J. Dav. Michaelis, Eichhorn, Gesenius, Wahl, Bretschneider, Winer, Rosenmüller, Hitzig, Hirzel, Ewald, Umbreit, De Wette, Knobel, Lücke, Paulus, Meyer, Olshausen, Hengstenberg, etc. The influence of the *grammatico-critical*, and *critico-historical* E. of modern Germany, is only beginning to make itself felt in this country. The most important contributions to the science recently made by British scholars, are those by Conybeare and Howson, Alford, Stanley, Jowett, Ellicott, etc.

EXELMANS, Remy Joseph Isidore, Comte, a distinguished French gen., was b. at Bar-le-duc, 13th Nov., 1775. He entered the army in 1791, was promoted to the rank of capt. in 1799, served with distinction in the campaign of Naples under Macdonald and Championnet, and in 1801 was attached as aide-de-camp to the staff of Murat. In 1808, while with Murat in Spain, he was arrested, and sent to England, where he remained a prisoner for three years. He was with Napoleon in the Russian campaign in 1812, for his brilliant conduct in which the emperor created him gen. of division, Sept. 8th of the same year. E. seems to have been equally esteemed under every successive government. On the fall of Napoleon, he was for some time banished from France, but was permitted to return in 1819. In 1831, Louis Philippe restored his titles and rank. Louis Napoleon named him grand chancellor of the legion of honor, and on Mar. 11, 1851, raised him to the dignity of *maréchal de France*. On the 21st July, 1852, E. had a bad fall from his horse, from the effects of which he expired on the following night.

EXERCISE, a very important element of medical regimen, both in the preservation of health and in the cure of disease. To preserve all the functions of the body in healthy action, it is necessary to secure their due and regular action or E.; to allow of complete inaction of any part or function, is to initiate disease, and probably even

structural change, or atrophy. Hence the development of the muscular system, of the secretions, and even of the mind and its organ, the brain, require the more or less regular use of E., either in the form of productive and useful work, or by means of artificially devised methods calculated to serve a like purpose in regard to the economy. Thus, scholastic education is exercise for the mind; gymnastics (q.v.), for the body. Both these means enter largely into enlightened medical practice, though they are often too much neglected. E., to be beneficial, must be attended with rest, to allow the tissues which are worn away during vital action to be restored; but rest of one part or organ is often best secured by bringing others into activity; so that, except during sleep, there is rarely a necessity for a complete and simultaneous disuse of all the faculties, or even of those most immediately under our control. The best regulated life is that which secures due and proportionate E. at intervals for all the functions, mental as well as bodily.

EX'ETER (the *Cær-Isc* of the Britons, the *Isca Damnoniorum* of the Romans, *Exancester* of the Saxons), a city, episcopal see, separate county, parliamentary and municipal borough, and river-port, in the s.e. of Devonshire, and the capital of that county. It lies on an aclivity on the left bank of the Exe, 10 m. n.w. of its mouth, 170 m. w.s.w. of London, and 73 m. s.w. of Bristol. It is on the whole well built and clean, and has two main lines of street meeting near the center. There are some fine squares and terraces. The guildhall has a singular portico, added in 1593, and projecting into the street. It was restored, with considerable regard to artistic effect, in 1864. In 1865, an elegant new post-office was erected, as was also a lunatic asylum, just outside the city. A quadrangle of almshouses, 45 in number, was completed in 1866, along with a church attached to them; and the Albert memorial museum was opened in 1868. The number of British and foreign vessels (sailing and steam) which entered the port in 1872 was 524, tonnage 61,000; which cleared it, 222, of 17,620 tons. The pop. of the parliamentary borough in 1871 was 44,226. E. cathedral, a cruciform structure, magnificent in its ornamentation, was erected 1112–1478. In one of its towers is the great Tom of E. or Peter's bell, 12,500 lbs. weight, and a large curious antique clock. E. has a large floating ship-basin, 917 ft. long, 90 to 110 ft. broad, and 18 ft. deep; and a ship-canal, 15 ft. deep and 30 ft. broad. This canal extends 5 m., and terminates at Turf, about 2 m. from the head of the estuary of the Exe. E. has magnificent nurseries, and exports dairy, farm, and orchard produce from a neighborhood rich in such products. The town sends two members to parliament. E. was anciently the chief residence of the West Saxon kings. E. bishopric, fixed here in 1050 by Edward the confessor, includes Devon and Cornwall, 23 deaneries and 588 benefices. The city was formerly surrounded with walls and strongly fortified. On a height to the n. of E. are the ruins of Rougemont castle, built by William I., on the site of one said to be as old as Cæsar's time. Many Roman and Greek coins have been found in E., besides tesselated pavements, fragments of columns, and small bronze statues.

EXETER, a village and one of the co. seats of Rockingham co., N. H., on Exeter river, and the Boston and Maine railroad, 51 m. n. of Boston; pop. of township '70, 3,437. The village is built around the falls, and the chief business is manufacturing, especially of cotton. Here is the richly endowed Phillips academy, which for generations has had a national repute, founded in 1781 by John Phillips; also the Robinson female seminary, with large endowment, and about 240 pupils. There is a good library belonging to the town. The place was settled in 1638 by the Rev. John Wheelwright, an exile from Massachusetts. It suffered greatly in the various Indian wars of the century, and 38 of its citizens died in the continental army. It is an attractive village, with cultivated society.

EXETER COLLEGE, Oxford. This college was founded in 1314 by Walter de Stapledon, bishop of Exeter, who removed from Hart Hall to the present site of E. C., a rector, and twelve fellows. In 1404, Edmund Stafford, bishop of Salisbury, added two fellowships, and gave the college its present name. Sir William Petre, in 1565, founded eight more; and in 1636, Charles I. annexed one more for the islands of Jersey and Guernsey. In 1770, Mrs. Sheers left certain rents for the establishment of two fellowships. All these fellowships were originally appropriated to various archdeaconries or counties, especially in the w. of England. A peculiarity in this college was, that the above foundations, though generally called fellowships, were, strictly speaking, only scholarships. Important changes were introduced by the rector and fellows, under the authority of 17 and 18 Vict. c. 81, and approved of by the commissioners appointed to carry out that act. The number of fellowships was reduced to 15—all open without any restriction as to place of birth. The revenues of two fellowships were divided among the rectorship and the 15 fellowships. The remaining 8 fellowships were devoted to the foundation of 22 scholarships; ten open without restriction; ten limited to persons born, or for three years educated in the diocese of Exeter; and two limited to persons born in any of the Channel islands. Several exhibitions also are attached to the college; and there are about 16 benefices in the gift of the society. The number of names on the books is about 750.

EXETER, or **EXON DOMESDAY**. See DOMESDAY BOOK.

EXETER HALL, a large proprietory building, on the n. side of the Strand, London, is 131 ft. long, 76 ft. wide, and 45 ft. high. It was completed in 1831, and can contain upwards of 3,000 persons. It is let chiefly for religious assemblies, and is in great request during the "May Meetings" of the several religious societies. It is also let as a concert-room and has been the scene of many great musical fêtes.

EXHAUSTIONS, METHOD OF, is a mode of proving mathematical propositions regarding quantities by continually taking away parts of them. The method was frequently employed by the ancient geometers; its fundamental maxim, as stated by Euclid, being that those quantities are equal whose difference is less than any assignable quantity. Euclid employs the method in Book x. Prop. 1; and it was used by Archimedes to prove that the area of a circle is equal to that of a right-angled triangle whose one leg adjoining the right angle is the radius, and the other the circumference. In this ancient method we may see the rudimentary form of the modern transcendental analysis.

EXHIBITION, ART. See ART EXHIBITIONS.

EXHIBITION, INDUSTRIAL (Fr. *Exposition de l'Industrie*). Exhibitions of this kind originated in France, where the first took place in 1798, at the suggestion of the marquis d'Avèze. It was held in the Maison d'Orsay and its grounds; but it appears to have been rather a collection of such objects of French art-manufacture as could be borrowed from their owners, than an assembling together of competing artists and manufacturers, with their respective works. It is, nevertheless, interesting as a historical fact, having been the first of these displays of which we have any clear and authentic record; and its more important effect was to familiarize the French mind with national exhibitions.

In the same year, another exhibition was held in Paris, on a grander scale, and with considerable success. It embraced all kinds of manufactures; whereas that at the Maison d'Orsay was chiefly devoted to those of artistic merit; hence the credit has been claimed for the latter one of being the commencement of industrial exhibitions, certainly, however, without justice or truth.

In consequence of the obvious utility of the exhibitions of 1798, another was held in 1802, under the consulate of Napoleon, with equal success, and thus led to the establishment of triennial exhibitions, which were, with occasional interruptions from political causes, held until the novel idea was originated in this country, in 1850, by his royal highness the prince consort, of holding a universal exhibition open to all comers.

That was not, however, the first industrial exhibition held in the United Kingdom. The Royal Dublin society, possibly from the French sympathies of Ireland during the revolution, as early as 1829 adopted the plan of triennial exhibitions, which was several years before any other part of the United Kingdom; they took place in the society's rooms in Dublin. Like the French, however, they at first comprised only specimens of native industry.

In England, the first well-organized exhibitions were those of the Cornish polytechnic society, in which were illustrated the mineral wealth of the co., and its mechanical appliances for mining purposes, etc. These were continued annually without intermission until 1850. Manchester, Birmingham, and Liverpool also held local exhibitions; that of the second town was by far the most important, and is fairly entitled to be considered the prototype of the 1851 exhibition; indeed, it is by no means certain that both did not arise from the same cause—the agitation in favor of a great national exhibition, commenced by his royal highness the prince consort and the society of arts as early as 1848. The Birmingham exhibition was held in 1849.

The Manchester exhibitions were the earliest held in the great English industrial towns, but they, like those which were held in the mechanics' institutes of Liverpool and Leeds, and subsequently in the collegiate institution of Liverpool, had a mixed character, the illustrations of art and manufactures being pretty well mingled with objects of natural history and various other curiosities, for the amusement of the visitors. That of Birmingham, however, was much more completely devoted to the true objects of industrial exhibitions; it was held in the spacious apartments of Bingley hall, and was a great success, especially when it is borne in mind that it was carried out solely by private enterprise. The multitudinous manufactures of that wonderful place were amply illustrated, and a most careful attention was paid to the exhibition of those objects of art which were best calculated to foster the taste of designers, and others, whose duty it was to give refinement to the masses, by gradually improving those objects of necessity and ornament in every-day use. The success of the Bingley hall exhibition no doubt acted most beneficially upon that of 1851 which was approaching, for it gave an unmistakable impetus to the industrial pursuits of the people of Birmingham, and through them acted widely upon others.

The first metropolitan movement in favor of holding a national exhibition in this country was immediately after the French exposition of 1844, the results of which were so beneficial, that several applications were made to the government requesting that the matter should be officially taken up. The government, however, as usual, proved itself to be simply executive, and did nothing.

In the meantime, the society of arts tried the experiment of holding exhibitions annually in their own building in the Adelphi; but these, though eminently successful, were not sufficient to satisfy those with whom a national exhibition had become a fixed

idea. In 1849, his royal highness devoted himself thoroughly to this object, and made the happy suggestion of throwing open the exhibition to all nations. The plans, too, were suggested for raising the necessary funds and other essential points, and the scheme soon took a tangible form; and it was finally determined by the government to issue a royal commission, which was gazetted Jan. 3, 1850. From this moment the great exhibition was fairly launched. In order to enable the commissioners to enter into contracts, and otherwise incur obligations, it was necessary to procure subscriptions to a guarantee fund. The subscription-list was opened by the queen with £1000. The exhibition took place in a vast structure of iron and glass, called the crystal palace, in Hyde park, London. The edifice, planned by sir Joseph Paxton (q.v.), was opened by her majesty, May 1, 1851. It was 1851 ft. long by 456 ft. broad, and 66 ft. high; the entire area covered being 13 acres. On the ground-floor and galleries there were 8 m. of tables. The glass employed in the structure weighed upwards of 400 tons. The number of exhibitors exceeded 17,000. The exhibition was open 144 days, being closed Oct. 11. The entire number of visitors was 6,170,000, averaging 43,536 per day. The largest number at one time in the building was 109,760, on Oct. 8. The entire money drawn for tickets of admission amounted to £505,107; and after all expenses were defrayed, a balance of £150,000 was left over; so that there was no call on those who subscribed the guarantee fund. Popularly, this great exhibition was properly enough called the world's fair, for it attracted visitors from all parts of the world. When the exhibition was over, the building was cleared away.

The importance of this celebrated exhibition was so obvious, that other countries became anxious to have something of the same kind. An exhibition was held in Cork in 1852; although not of international character, it was the first for which any special structure was erected in Ireland, and deservedly gave great satisfaction. The home manufactures of Ireland were admirably displayed in conjunction with those of other parts of the kingdom. Dublin got up an international exhibition in 1853, and by the princely munificence or Mr. Dargan, was enabled to make an admirable display, in a building of great beauty. The Dublin society added a new feature—high art was associated with industrial art, and a gallery of pictures, the finest ever brought together in this kingdom before, was there exhibited with great success. In the same year, a similar exhibition took place in a crystal palace in New York. France, in 1855, repeated the same experiment with immense success; both the industrial and the art collections were such as the world had never seen before. Though wanting the imposing magnitude of the Hyde park building, the contents of the palais de l'industrie, with its detached picture-gallery and its annèxe, were of the choicest description, and reflected the highest credit on French taste and skill. Several other continental nations followed with various success. In Europe, it has now taken root, and every country looks upon an exhibition of its industrial resources and productions, from time to time, as a grand necessity which must be met. In 1861, there was an exhibition at Haarlem, in which a vast assemblage of admirably arranged specimens illustrated every industry followed by the most industrious and methodical people of Europe. In Belgium, also, a small industrial exhibition was held in 1861 at Brussels, consisting chiefly, however, of articles of use, in which useful design was the chief consideration.

Such is a brief outline of the early history of these exhibitions, which now form a prominent feature in this era of the history of civilization. The fullness of their effects is still to be seen, but, judging of the beneficial effects they have already produced, it is not too much to say, that they appear destined to help most largely in diffusing a love of industry, and a peaceful emulation over the whole globe. Commerce may have its weak points, even its meannesses, but it cannot be denied that few of the occupations of man are more humanizing, or tend more to teach the value of peace and good-will; and if this be conceded, certainly nothing can more assist it than these great gatherings, in which each nation shows its own specialities, and gives to others the ideas which it has accumulated through its centuries of progress in industrial art. Like the social interchange of thought, this interchange of inventive genius brings out new talents; and succeeding generations will reap a rich harvest of results from our industrial exhibitions. To mark the advance in the arts of the interval, and promote manufacturing and commercial activity, an exhibition, on a still greater scale, was arranged to take place at Kensington, London, in 1862; in which were to be comprehended paintings in a high style from all countries. See *Official, Descriptive, and Illustrated Catalogue of the Great Exhibition of* 1851 (3 vols.); also *Reports by the Juries* (2 vols.); and the 13 vols. folio, printed by the commissioners.

Since the article on this subject first appeared in the *Encyclopædia*, several international exhibitions have been held—one in 1862 in London; the next in 1865 in Dublin; the third in Paris in 1867; in 1873, the great universal exhibition of Vienna; that of Philadelphia in 1876; etc. That of 1862, was held in a vast brick building, lighted by a roof and two immense cupolas of glass, designed by capt. Fowke, R.E., and erected on a large space of land acquired by the royal commissioners of the great exhibition of 1851, adjoining the beautiful garden of the horticultural society at South Kensington. The space covered was 1,291,800 sq. ft., or about 17 acres, including some portions of the buildings of the garden, lent by the horticultural society, for refreshment-rooms, etc. Of this vast space, 891,146 sq. ft. were occupied by objects exhibited, besides

284,670 sq. ft. of wall and other vertical space made by internal partitions, etc.: to which must be added 93,220 of horizontal and vertical space occupied by works of art, arranged in one of the most admirably constructed galleries ever designed for such a purpose. The entire cost of this gigantic affair was £321,000. This was secured against all risk of failure by a voluntary guarantee entered into by 1152 gentlemen of all ranks, who pledged themselves in various sums amounting, in the aggregate, to £450,000. Notwithstanding much opposition and ill-feeling, the international exhibition of 1862 proved a great success. Like its predecessor in 1851, it gave a vast impetus to trade generally, and it enabled the public to form correct opinions upon the progress of our manufactures, and their shortcomings when compared with others.

The next exhibition of importance was that held in Dublin in 1865, which was originated by a company, whose object was to establish the principle of decennial exhibitions, and, if possible, make this one pay the expense of erecting the magnificent building in which it was held, and thereby form a permanent home for such exhibitions and other useful purposes in future. This building was of brick, covered with stucco, and the roof of glass and iron, light but commodious galleries running entirely round the interior. The whole surface occupied by the structure was 5,700 sq. yards. It was, in every respect, well adapted for the purposes for which it was raised, and had an extensive pleasure-garden nearly surrounding it. The exhibition was successful in everything but its pecuniary results. It was amply patronized both by foreign exhibiters and visitors, and like that of 1862 in London, and the previous ones of Dublin and Paris, it combined fine arts with the manufactures, mining, and other industries.—The year 1867 witnessed, in Paris, the greatest, up to that time, of all international exhibitions, both with respect to its extent, and to the scope of its plan. Its site was on the Champ-de-Mars, the great military parade-ground of Paris, and it occupied the enormous space of 37 acres. It consisted of a large building of an elliptical form, arranged in twelve concentric circles, with a small open central garden. The outer circle was much more lofty and broader than any of the others, was roofed with corrugated iron, and lighted with clerestory windows, and was devoted to machinery of all kinds, and to the processes of manufacture in various branches of industry. Outside this circle were placed practical illustrations of the food department, in the form of restaurants of all nations —the exhibition of specimens of food substances being in small courts within the outer wall, or back to back with the restaurants. The first circle within that for machinery was for metallurgy, chemistry, dyeing, etc.; then followed textile materials, clothing, household furniture, personal ornaments, plate, porcelain, etc.; then matters relating to general and special education. Then came the gallery of fine arts, in which the paintings, sculpture, and other fine-art works of all nations were exhibited; and within this circle, again, was another, in which an archæological collection from each country was displayed, for the purpose of showing the rise and progress of industrial art in every country. This was a novel and most valuable addition, admirably conceived and carried out. Another most important feature in the Paris exhibition was the park, or out-of-door portion, which occupied by far the larger part of the whole space. In this were shown actual examples of the styles of domestic and palatial architecture of most countries, and even the tents of some of the nomad tribes, such as the Kirghis Tartars, and Samoyeds of the Russian empire, the Bedouin Arabs, etc. The beasts of burden of different nations, such as horses, camels, etc., were also shown, and all kinds of civil and military erections of general importance. The exhibition had great and deserved success; it was visited by most of the principal monarchs of the world, and vast multitudes of people. Pecuniarily, however, it did not succeed.

Since the Paris exhibition of 1867, there have been important ones held in Sweden (1868) and in Denmark (1872); at Moscow (1872); Vienna (1873); Philadelphia (1876); Paris (1878). And the English colonies of New South Wales and Victoria showed their enterprise and confidence in their resources by resolving on exhibitions at Sydney in 1879 and Melbourne in 1880.

The quasi-international Moscow exhibition of 1872 was organized by the Moscow polytechnic society, and merely patronized by the government. It was, however, on a large scale and admirably managed—its various buildings, etc., completely occupied the Alexandra gardens round two sides of the Kremlin, a length of over two English m., and the great riding-school. In its arrangement the greatest skill was shown, and its classification was the best and most scientific which has ever yet been attempted. Each special group of objects had separate buildings. Thus, for instance, medical science, which was fully represented, had a series of buildings, three model hospitals, besides those in the military department—all fully furnished—dispensaries, a pharmacien's shop, and a garden in which all the medicinal plants were growing; an exhibition of all kinds of surgical instruments and appliances, and a great variety of other matters appertaining to medicine and surgery; a dentist's establishment, with everything appertaining to dentistry, whether to the treatment of natural teeth, or the manufacture of artificial ones; and so on. Should ever a great international exhibition be carried out on the same grandly conceived plan, it will be the greatest educational effort possible.

The two Scandinavian ones in magnitude exceeded those held in Dublin; they were very interesting, and were under good management successful in all respects.

The Vienna exhibition of 1873 far exceeded in magnitude any previous one, and although unfortunate in many respects, was, upon the whole, an event of which Austria has good cause to be proud; and its ultimate results, there is every reason to hope, may show great commercial benefits, as it brought every civilized nation to Vienna, and doubtless will be the means of extending Austrian commerce, by making the general excellence and great variety of Austrian and Hungarian manufactures better known. The main building, which still remains, was the largest that had been constructed, being nearly four times the size of that in which the Paris exhibition of 1867 was held: it consists of a vast gallery or nave, 2,980 ft. in length, in the exact center of which is placed a great central hall, 426 ft. in diameter, covered with a conical iron roof and lantern rising to the height of 160 feet. At each extremity of the main avenue, another gallery, 660 ft. in length, is placed transversely to the chief one, and another of similar length crosses the nave at a distance of 114 ft. from each of these terminal transepts, whilst each of these pairs have their extremities connected by ranges of offices. Sixty-six ft. from the central rotunda on each side is a similar transept connected by two others parallel to the line of the main avenue, and thus forming a square inclosing the rotunda. Ten other transepts cross the main avenue; the height of all the galleries being about 50 feet. Vast as this structure was, it was found insufficient; and numerous halls and other annexes had to be built. The entire extent under roof is said to have exceeded 60 acres. A severe outbreak of cholera, and a deplorable monetary crisis occurring during the exhibition, marred its success.

The next great international exhibition was that of the United States of America, which was held in Philadelphia in 1876, in honor of the centenary anniversary of American independence. The main building was 1876 ft. long, and 464 ft. broad. The machinery-hall was 1400 ft. long, and in all no less than 190 buildings were erected for the purposes of the exhibition. The work of preparation and building occupied 21 months. Between the 10th of May, when the exhibition was inaugurated with elaborate ceremonies, till Nov., it was estimated that no fewer than 8,000,000 paid for admission. Both commercially and in other respects, this memorable enterprise was very successful.

The French nation gave a remarkable illustration of the elasticity of its energy and the wealth of its resources, by undertaking an international exhibition at Paris in 1878, but a few years after national calamities unparalleled in recent history. And the enterprise met with success greater than could have been anticipated. Opened on the 1st May, by the president, marshal MacMahon, it was visited ere its close in Oct., by multitudes from all civilized lands. The huge building erected for the display in the Champ de Mars, was called the Palace du Trocadéro, and is designed to be permanent. The close was marked by a lottery on a very large scale, the innumerable prizes being selected chiefly from among the exhibits.

EXMOOR FOREST, a moory, mostly uncultivated waste, consisting of dark ranges of hills and lonely valleys, 14 sq.m. in area, in the w. of Somersetshire and n.e. of Devonshire. It is bordered by deep wooded glens. The hills rise in Dunkery Beacon to 1668 ft., in Chapman Barrow to 1540, and in Span Head to 1510. Devonian slates, with some new red sandstone in the n., from the substratum. It is covered with heath, interspersed with juniper, cranberry, and whortleberry, with much meadow-land. Throughout this tract there is a native breed of ponies, known as Exmoor ponies, reputed to be stout and hardy. Since 1851, E. has become an iron-mining district. The river Exe, and its tributary the Barle, rise in Exmoor. It is subject to winds and mists.

EXMOUTH, a t. in the e. of Devonshire, on the left bank of the mouth of the Exe, 10 m. s.e. of Exeter. It stands at the base and on the slope and top of a hill rising from the sandy estuary of the Exe. It is noted for its mild climate. From about 1700, it was the chief watering-place on the Devon coast, till the rise of Torquay. There is a fine promenade on a sea-wall 18 ft. high. The Woodbury Hills on the e., 800 ft. high, protect it from the e. winds. Here Sueno the Dane landed in 1003. It was taken by the royalists in 1646. Pop. '71, 5,614.

EXMOUTH, EDWARD PELLEW, Viscount, a famous naval commander, was b. at Dover, April 19, 1757. He entered the navy when 13 years of age, and first attracted notice by his gallant conduct in the battle on lake Champlain, Oct. 11, 1776. In 1782, he attained the rank of post-capt. In 1793, having been appointed to the command of the *Nymphe*, a frigate of 36 guns, he encountered, and, after a hard fought battle, captured *La Cleopatre*, a French frigate, which carried the same number of guns. For this victory, he was knighted. In 1799, he received the command of the *Impétueux*, 78 guns, and was sent to the French coast, where many of his most brilliant actions took place. In 1804, sir E. Pellew was advanced to the rank of rear-admiral of the red; in 1808, to that of vice-admiral of the blue; and in 1814, he was raised to the peerage, with the title of baron E. of Canonteign, Devonshire, with a pension of £2,000 a year. In 1816, he was sent to Algiers, to enforce the terms of a treaty regarding the abolition of Christian slavery, which the dey of Algiers had violated. With a combined fleet of 25 English and Dutch vessels, he bombarded the city for seven hours, and inflicted such immense damage, destroying all the Algerine fleet and many of the public buildings,

that the dey consented to every demand. E., who had been wounded in the leg and cheek in this action, received on his return to England the thanks of both houses of parliament, and was promoted to the rank of viscount, 10th Dec., 1816. In 1821, he retired from public service, loaded with honors. He died 23d Jan., 1833.

EXOCETUS. See FLYING-FISH.

EXODUS ("the departure"), the name given to the second book of the Pentateuch. It may be regarded as composed of two parts—the first historical, and the second legislative. The historical extends to the end of the 18th chapter. It embraces a narrative of the various preparations, natural and supernatural, made under the providence of God for the deliverance of the Israelites from their bondage in Egypt, and also describes the accomplishment of their deliverance, and the journeyings of the people in the wilderness as far as Mt. Sinai. The legislative is devoted to a minute and elaborate account of the institution of the theocracy. The book presents us with three aspects of Hebrew history. We have, first, a picture of a people enslaved; second, of a people redeemed from bondage; and third, of a people sanctified and set apart to the service of God. The period embraced by the history of the book is usually reckoned at 142 or 145 years, which number is obtained as follows: From the death of Joseph to the birth of Moses, 60 or 63 years; from the birth of Moses to the departure from Egypt, 80 years; and from the departure out of Egypt to the erection of the tabernacle, 1 year. It cannot be denied, however, without wildly violating all the ordinary laws of the increase of population, that this is much too short a period to account for the existence of such a number of Hebrews as left Egypt—viz., 600,000, exclusive of women and children—i.e., in all, at least, 2,500,000. Those who went down into Egypt with Jacob were "threescore and ten souls," and in 215 years, these, though prohibited from intermarrying with the Egyptians, had amounted to between two and three millions. The writer of E., indeed, says (chapter xii., verse 40) that "the sojourning of the children of Israel, who dwelt in Egypt, was 430 years," adding that they left the land "even the self-same day" on which they had entered it. This statement, however, does not seem to harmonize with the author's previous narrative, and is certainly inconsistent with the language of the apostle Paul, who says (Gal. iii. 17) that the law was given 430 years after the covenant with Abraham, which took place about 215 years before Jacob and his sons went down into Egypt, so that, according to this view, the Israelites could only have been in Egypt 215 years. This is the number commonly accepted; but it is not wonderful that some writers should affirm that "it would be more satisfactory if we could allow 430 years for the increase of the nation in Egypt rather than any shorter period." A still longer period would undoubtedly afford additional satisfaction; and Bunsen, in his *Ægypten's stelle in der Weltgeschichte*, endeavors to show that the Israelites were in Egypt for *fourteen* centuries instead of two, and that the number 215 only indicates the period of oppression, the time when they were "evilly entreated." This conclusion is, of course, arrived at by the application of principles of criticism not generally recognized in the schools of British theology; but there seems no avoiding the conclusion, that the usual chronology is hopelessly wrong.

May it not be that the interval which elapsed between the death of "Joseph and all his brethren, and all that generation" (E. i. 6), and the period when there arose up a new king over Egypt which knew not Joseph (E. i. 8), was much longer than we suppose? The passage itself in E. seems to favor this idea; for the intervening verse (E. i. 7) speaks of the children of Israel "increasing and multiplying, and waxing exceeding mighty, and filling the land," without any reference at all to the time occupied in this process; and such words are certainly more applicable to a series of centuries than of years, while centuries, besides, would harmonize better than years with the statement that the Egyptian king knew not (i.e., had forgotten all about) Joseph. The only grave objection to this otherwise extremely probable hypothesis, is its incompatibility with the statement of St. Paul; an objection, however, which Luther would not have found insurmountable, for in an exactly similiar case he said of the inspired Stephen that "he was no historian, and did not trouble himself about particulars."—*Zu Apostelgesch.* vii. Bd. 1, 1160.

In explanation of the chronological difficulty, the confusion resulting from the use of *letters* as numerals in Hebrew MSS. has been urged; and this is notoriously a fertile source of error and contradiction, which rationalistic critics have not sufficiently kept in mind. To adduce such a reason, however, would be unavailing in the present case; for if it could be proved that the period stated in E. may have been abbreviated through the negligence of some careless transcriber, or otherwise, and thus an approximation be made to the *fourteen* centuries of Bunsen, this would only place the writer of the Pentateuch in more visible antagonism with St. Paul himself. The date of the exodus is fixed by Usher at 1491 B.C.; by the Septuagint, at 1614 B.C.; by Hales at 1648 B.C.; by Wilkinson, about 1495 B.C., in the reign of Thothmes III.; and by Bunsen, as late as 1320 or 1314 B.C., in the reign of Menephthah, in the latter of which years Manetho gives what appears to be the Egyptian version of the event. The genuineness and authenticity of the book of E. have been sharply criticised in modern times; but in fact, as early as the time of Josephus (*Ant.*, ii. 16), there were Jews who looked upon the miracle of the crossing of the Red sea, etc., as fabulous. Among the theologians

who have questioned the integrity of E., are Von Lengerke, Stähelin, De Wette, Knobel, and Colenso, who find traces of an older and a later author, the former of whom they call Elohistic, and the latter Jehovistic. Their objections have been replied to by Hengstenberg, Hävernick, etc., who endeavor to show that the distinction is artificial, and the attempt to follow it out in detail a failure. See PENTATEUCH.

EXOG'ENOUS PLANTS, or EXOGENS (Gr. *exo*, outwards; *gennao*, to produce), are those in which the woody substance of stem increases by bundles of vascular tissue added externally. The exogenous stem contains a central *pith* (q.v.), from which *medullary rays* proceed to the bark (q.v.), and the bark is very distinct from the fibro-vascular or woody part which it surrounds. The exogenous is thus very different in structure and manner of growth from the endogenous or the acrogenous stem. Amidst the cellluar substance of the young stem, when it has developed itself from the seed, woody cords are seen connecting the cotyledons, and afterwards the leaves, when these appear, with the root, in the central axis of which they join. A section of the stem exhibits the cellular substance traversed by vascular bundles (woody fiber), which in the section are more or less wedge-shaped, radiating from the center, but yet not prolonged into the center itself, which, even to the greatest age of the stem, remains occupied by the cellular pith. Additional bundles are interposed, as growth proceeds, diminishing the proportion of cellular substance in the stem, yet without these bundles ever becoming so compacted together as to cut off the communication between the cellular center of the stem and its bark, which is maintained by means of the medullary rays, often, indeed, imperceptible to the naked eye, but always present even in the hardest and most close-grained wood. The woody layers which are formed in successive years, as new leaves and branches are developed, are formed amidst the *cambium* (q.v.), into which the woody fibers of the new leaves descend, between the bark and the former wood. Thus the concentric circles are formed, usually one for each year's growth, distinguishable even in the most matured timber, and by which the age of trees is very commonly computed. The beginning of each new layer is generally marked by a greater abundance of *porous vessels*, the openings of which are conspicuous in the transverse section. In pines, the line of separation between the layers is marked by greater density of texture, and often by deeper color. The age of trees cannot, however, be calculated with perfect certainty from the concentric circles of the stem, as any circumstance which temporarily arrests the growth in any summer, may produce an effect similar to that ordinarily produced by the change of seasons; whilst in the trees of tropical countries, at least where the wet and dry seasons are not very marked, concentric circles are often not to be discovered.

The structure of the branch of an exogenous tree perfectly corresponds with that of the stem. The vascular bundles of the stem or branch form a loop where a leaf begins, and those of the leaf and its axillary bud spring from the loop. The roots of exogenous plants have not a central pith like the stem, but in a few trees, as the horse-chestnut, the pith is prolonged to some extent into the root.

Anomalies are not unfrequently to be met with in the structure of exogenous stems, and particularly among the twining woody plants of tropical countries. There are also very many herbaceous plants, in which, although the structure agrees with that of an exogenous tree in its first year, no further development is ever attained; whilst in many, even this is very imperfectly reached; but yet these are on other accounts unhesitatingly classed with exogenous plants. The exogenous stem and dicotyledonous seed are so constantly found together, that the designation exogenous plants is often applied to that great division of the vegetable kingdom, which is also called dicotyledonous. See BOTANY. Exogenous plants are also characterized by a particular mode of germination, with reference to which they are called *exorhizal* (Gr. *exo*, outwards; *rhiza*, a root), the radicle simply lengthening, and not having to break through the coat of the embryo. The leaves of exogenous plants generally exhibit a net-work of veins, instead of the parallel veins characteristic of endogens, and a greater proportional breadth of leaf usually accompanies this reticulated venation.

Exogenous plants are far more numerous than endogens. All the trees and shrubs of Britain, and those of temperate and cold climates generally, are exogenous, as well as very many herbaceous plants of these parts of the world, and many trees, shrubs, and herbaceous plants of the tropics. Almost all trees, except palms and a few *liliaceæ*, *pandanaceæ*, and tree-ferns, are exogenous.

EXORCISM (from *exorkizo*, to conjure), i.e., conjuration in the name of the gods, the term used by the fathers of the church to denote the act of conjuring evil spirits, in the name of God or Christ, to depart out of the person possessed. The first Christians adjured evil spirits in the name of Jesus Christ, who had conquered the devils; but as the opinion was at the same time entertained, that all idolaters belonged to the kingdom of Satan—who suffered himself to be worshiped under the form of idols—it was customary to exorcise heathens previous to their receiving Christian baptism. After Augustine's theory of original sin had found acceptance in the 5th c., and all infants were regarded as belonging to Satan's kingdom, E. became general at the baptism even of Christian children. Following the practice of the Roman Catholic church, Luther retained E., but it was laid aside by the Reformed church. Although abandoned by

illustrious and orthodox Protestant theologians, such as Chemnitz and Gerhard, or deemed unessential, and in modern times done away with by the "Protestant" church, the practice has been recently revived by the Old Lutheran or High-church party.

In the Catholic church, the function of E. belongs peculiarly to one of the so-called "minor orders." See ORDERS. Our Lord having not only himself in person (Matt. ix. 32, Mark i. 25, Luke iv. 35, viii. 29) cast out devils, but having also given the same power to his disciples, it is believed to be permanent in the church. Of its exercise in the early church, both in relation to "energumens," or persons possessed, and in the administration of baptism, there are numerous examples. Tertullian and Origen speak of it as of ordinary occurrence, and the council of Carthage, in 255, alludes to its use in baptism. The rite of E. is used by the modern church in three different cases: in the case of actual or supposed demoniacal possession, in the administration of baptism, and in the blessing of the chrism or holy oil, and of holy water. Its use in cases of possession is now extremely rare, and in many diseases is prohibited, unless with the special permission of the bishop. In baptism it precedes the ceremony of applying the water and the baptismal form. It is used equally in infant and in adult baptism, and Catholic writers appeal to the earliest examples of the administration of the sacrament as evidence of the use of E. in both alike. The rite of baptismal E. in the Roman Catholic church follows closely the scriptural model in Mark viii. 33. The exorcisms in the blessing of the oil and water resemble very closely the baptismal form, but are more diffuse.

EXOSMOSE. See ENDOSMOSE.

EXOSTEMMA, a genus of American trees and shrubs of the natural order *cinchonaceæ*, nearly allied to *cinchona*. Several species yield febrifugal barks, which, however, do not contain the cinchona alkaloids. The most valued of these barks are caribbee bark (q.v.) and Saint Lucia bark, the latter of which is the produce of *E. floribunda*, a native of the more mountainous parts of the West Indies.

EXOSTOSIS (Gr. *ἐξ*, out of, and *ὄστεον*, bone), a bony tumor growing from some of the osseous structures of the body. See TUMOR.

EXOTERIC. See ESOTERIC.

EXOTIC PLANTS, or EXOTICS (Gr. coming from abroad), cultivated plants originally derived from foreign countries. The term is most frequently applied to those of which the native country differs so much in soil or climate from that into which they have been conveyed, that their cultivation is attended with difficulty, requiring artificial heat or other means different from those requisite in the case of indigenous plants. The cultivation of many such exotics is carried on with great success in our greenhouses and hot-houses; but there are a few which, notwithstanding all the care of the gardener, can almost never be made to flower, and others which, although they flower, seldom produce ripe fruits and seeds. Nor are difficulties of this kind experienced only in the cultivation of those which belong to warmer climates than our own, but sometimes even with the natives of colder regions; thus, the delicious fruit of the *rubus arcticus*, abundant in the most northern parts of Europe, is scarcely ever to be seen in the gardens of Britain, although the plant grows with sufficient luxuriance.

EXPANSION. See HEAT.

EXPATRIATION, a voluntary change of residence and allegiance from one's native land to another country and government. Despotic governments have assumed the right to forbid such a change on the part of their citizens, but the United States recognizes the right of the individual citizen, at his own pleasure, to leave the country of his birth and make his home in a foreign land. Naturalization, however, is necessary to the complete transfer of allegiance. The United States defends the rights and liberties of naturalized, precisely as it does those of native citizens. A naturalized citizen of this country, visiting his native land, is protected by the American flag as though he had been born on American soil. Of course, this right of expatriation cannot be made a cover for a previous breach of trust, or the commission of any crime, in the place of one's birth; but the assumption that the law of his native land requiring him at a certain time of his life to do military duty, nullifies for the time being a man's right of expatriation, is not allowed by the United States. Thousands of young men leave the old world for the avowed purpose of avoiding military conscription, and the United States welcomes them to citizenship, with all its rights and obligations.

EXPECTATION (Lat. *expectatio*, a waiting, or looking out), i.e., the treatment of disease without active remedies, by simply observing its progress and averting its consequences through physiological means; as, for instance, when a fracture (q.v.) is treated by keeping the ends of the broken bone in their proper place, until the natural processes of repair are completed. E. is in this and other cases obviously a quite different thing from inaction, or the systematic doing of nothing, with which it has been sometimes confounded.

EXPECTATION OF LIFE. See PROBABILITY.

EXPECTATION WEEK is the name given to the period elapsing between Ascension day and Whitsunday, because during this time the apostles continued praying in earnest expectation of the Comforter.

EXPECTORANTS (Lat. *ex*, out of, and *pectus*, the breast), medicines given to carry off the secretions of the air-tubes. See BRONCHI, BRONCHITIS. The principal E. are antimony, squill, ipecacuanha, senega, balsam of tolu, lobelia, gum ammoniac, asa-fœtida, galbanum, etc.

EXPECTORA'TION (see EXPECTORANTS), the mucus or other secretion discharged from the air-passages. The examination of E. is of the utmost value in the diagnosis of diseases of the chest, as will be seen in their separate description. See CHEST, BRONCHITIS, PNEUMONIA, CONSUMPTION, etc.

EXPENSES or COSTS OF A LAWSUIT. The arrangements adopted in England with reference to charges exigible from the parties to lawsuits are stated under COSTS. In Scotland, these charges are commonly spoken of as expenses, and in the present article we shall, consequently, confine ourselves to the Scottish practice. In addition to demanding payment of the sum claimed, or performance of the alleged obligation where it has no reference to a pecuniary transaction, the pursuer of an action at law in Scotland almost always asks the court to pronounce decree in his favor for the expense of the proceedings which he has found it, or may find it, necessary to institute. On the other hand, the defender usually demands the expense attending his defense; and the general rule is, that the party found ultimately to be in the wrong has decree pronounced against him for the expense which he has occasioned to his opponent, as well as for the subject-matter of the suit. As it is quite usual for a party to succeed in one branch of his action, and to fail in another; or to occasion unnecessary expense by the unskillful or careless mode in which he conducts some portion of it, even though on the whole he be in the right; the adjustment of the amounts incurred by the parties respectively often involves not only much nicety of calculation, but questions of very considerable legal difficulty. In so far as the adjustment of expenses is a matter of calculation, it is effected by the auditor of the court of session, or of the interior courts. See AUDITOR and SHERIFF. In so far as it involves questions of law, these, if not previously decided by the judge, must be carried back to him from the auditor. If either party means to object to the amount awarded to him by the auditor in his report, he must lodge with the clerk of the process a short note of his objections without argument. A copy of this note must be furnished to the agent for the opposite party, and the court, or the lord ordinary, before whom the action depended, may direct the objections to be answered either *vivâ voce* or in writing. Should the objector fail to make good his objection, the expense of discussing it will be laid on him. If the objection has been stated to the auditor, and he has reported it to the court, it does not follow that the expense of discussing it will be laid wholly on the objector, even if unsuccessful. Where an appeal to the house of lords has been actually presented, and service of an order thereon has taken place, a motion for expenses is incompetent, but a mere intimation of an appeal is not enough to prevent decree for expenses being pronounced. If the agent who has conducted the cause wish it, the decree for expenses will be pronounced in his favor; and the party found liable will not be allowed to plead a counter-claim against the client, as by that means he might prevent the agent from recovering what he very probably has disbursed. The taxation of expenses is said to be between *party* and *party*, and not between agent and client; that is to say, the losing party has to pay only the expenses which have been necessarily incurred in discussing the question between the parties judicially, not the unnecessary expenses which the over-anxiety of the successful party may have led him to incur to his own agent. Practically, there are very few cases in which the expenses recovered do cover all the *boná-fide* claims of the agent against his client, which is the chief reason why litigation is always attended with expense, even to the winning party.

EXPERIMENT and observation are the means by which we extend and confirm our knowledge of nature. An E. is properly a proceeding by which the inquirer interferes with the usual course of a phenomenon, and makes the powers of nature act under conditions that, without his interference, would never, perhaps, have presented themselves all together. The introduction of E. distinguishes the modern method of investigating nature from that of ancient times and of the middle ages. It is by this means that physics and chemistry have made such rapid strides within the last two centuries. Through E., the investigator becomes master of the phenomena he is considering; for he can contrive to set aside the unessential circumstances that so often conceal the real relations and conditions of things, and make these come out into the light. Experiments exhibited during a lecture on any branch of science are made, not with a view to the discovery of truth, but to aid in the exposition of truths already discovered; they are sometimes called demonstrative experiments.

EXPERT (Lat. *expertus*, from *ex* and *peritus*, specially skilled), a man of special practical experience or education in regard to a particular subject—a word commonly applied (after the French) to medical or scientific witnesses in a court of justice, when selected on account of special qualifications, as in the case of an analysis of the con-

tents of the stomach in suspected poisoning. The term is similarly applied to a person professionally skilled in hand-writing, for detection of forgery of deeds and signatures.

EXPIATION OR ATONEMENT, DAY OF, among the Jews, is the 10th day of the month Tisri (corresponding to a part of our Sept. and Oct.), observed annually as a day of humiliation and atonement for national sin: the only day of national humiliation which Moses prescribed. The commandment to observe it was three times solemnly given, and the religious ceremonies peculiar to it were definitely ordained. All the people were required to refrain from work as strictly as on the Sabbath, and to afflict their souls in remembrance of their sins. In this humiliation fasting was probably designed to be included, and has been strictly practiced. The chief significance of the observance, as also its heaviest burden, centered in the high-priest as the representative of the nation before God. 1. The seven previous days were spent by him in nearly total separation from all other persons, and in careful preparation for his special duties. 2. "During the whole of the seven days, as well as on the day of atonement" (according to the statements of the rabbins) "the high-priest had to perform the ordinary sacerdotal duties of the daily service himself." 3. It was the only day of the year in which even he was allowed to enter the most holy place. 4. He was clothed in the linen priestly vestments instead of the splendid robes which at other times distinguished him. 4. He offered sacrifice first for himself and his house, sprinkling the blood and burning incense before the mercy-seat. 5. He took two goats for the sin-offering in behalf of the people, presenting both before the tabernacle, and having cast lots to determine which one should die, sacrificed it on the altar and carried its blood within the veil; then having confessed over the head of the living goat all the sins of the people, he sent it away under the charge of a trusted man to be set free in an uninhabited part of the wilderness. By this double offering as parts of one sacrifice the two great facts of redemption were represented: 1st, that an atonement for sin was made to God; and 2d, that the burden of sin was removed from man. In modern times the Jews continue to observe the day, beginning the ceremonies with what can be regarded, at best, as only a mournful parody on the offering of the scape-goat, fasting strictly through the day, and closing the service by reading the Scripture command for sacrifices which they can no longer bring.

EXPLOITS, RIVER OF, one of the largest rivers in Newfoundland, rising in the s.w. part of the island and running n.e. to the bay of Exploits, into which it falls about 49° n. and 52° w. Steamers go up 12 m., and small boats can pass to within 50 m. of the s.w. coast. The valley is fertile and abounds in game, being sparsely settled as yet, and the river is bountifully supplied with fish.

EXPLOSIVES. There is a question as to the influence, direct or indirect, upon modern civilization of the introduction of explosive agents for the purpose of war. Some eminent authors have gone so far as to consider the invention of gunpowder as next in importance, in its ultimate effects, to those of printing and the application of steam power. However this may be, it is well to remember that explosive substances are now of immense utility in the arts of peace; indeed, it is not too much to say that without their aid many of the great engineering enterprises of the present day would either be impossible, or else have to be carried out at a vast additional expenditure of time and labor. The germ of all the knowledge which we possess of explosive reaction undoubtedly lay in the probably accidental discovery, many ages ago, of the deflagrating properties of the natural substance niter or saltpeter (KNO_3), when in contact with incandescent charcoal. By distilling niter with oil of vitriol, the alchemists obtained a corrosive fluid which they called *aquafortis*, now known as nitric acid (HNO_3), which parts with its oxygen even more rapidly than saltpeter; so that if the strongest nitric acid be poured upon finely powdered charcoal, the latter takes fire at the ordinary temperature. Somewhat less than half a century back, it was discovered by some French chemists that upon treating various organic substances, such as starch, the sugars, cotton fabrics, and even paper, with concentrated nitric acid under proper precautions, the chemical constitution of the substances underwent a great change, and they became endowed with violently explosive properties, while remaining for the most part unaltered in external characteristics. To this discovery we owe a distinct class of explosive compounds, the most powerful for practical purposes as yet known.

Examining into those principles of constitution and action which are more or less common to all explosive substances, we may define, for our purpose, the term "explosive" as the sudden or extremely rapid conversion of a solid or liquid body of small bulk into gas or vapor, occupying very many times the volume of the original substance, and, in addition, highly expanded by the heat generated during the transformation. This sudden or very rapid expansion of volume is attended by an exhibition of force, more or less violent according to the constitution of the original substance and the circumstances of explosion. Any substance capable of undergoing such a change upon the application of heat, or other disturbing cause, is called "explosive." The most explosive substances that are practically the most important essentially contain carbon, oxygen, and nitrogen, the last always existing in a state of feeble combination with the whole or part of the oxygen, and thus creating that condition of unstable chemical equilibrium which is necessary. When explosion takes place, the nitrogen parts with

its oxygen to the carbon, for which it has a greater affinity, forming carbonic acid (CO_2) and carbonic oxide (CO) gases, the combination being accompanied with great generation of heat, and the nitrogen is set free. In most explosives there is also hydrogen accompanying the carbon, and by its combustion producing an extremely high temperature; it combines with part of the oxygen to form water in the form of greatly expanded vapor. Other subordinate elements are often present; in gunpowder, for instance, the potassium binds the nitrogen and oxygen loosely together in the state of saltpeter, and there is sulphur, a second combustible, whose oxidation evolves greater heat than that of carbon. When chlorate of potash is present, the chlorine plays the part of nitrogen, and is set free in the gaseous state. Two very unstable and practically useless explosive substances, the so-called chloride and iodide of nitrogen, contain neither carbon nor oxygen; but their great violence is equally caused by the feeble affinities of nitrogen for other elements, large volumes of gaseous matter being suddenly disengaged from a very small quantity of a liquid and solid body respectively.

Explosives may be conveniently divided into two distinct classes—(1) explosive mixtures, and (2) explosive compounds. The first class consists of those explosive substances which are merely intimate mechanical mixtures of certain ingredients, and which can be again separated more or less completely by mechanical means, not involving mechanical action. These ingredients do not, as a rule, possess explosive properties in their separate condition. There are, however, explosives which might almost be classed in both categories; for example, *picric powder* is composed of ammonium picrate and saltpeter, the former of which contains an explosive molecule, but is mixed with the latter to supply additional oxygen, and thus increase the force. If a substance that will burn freely in air, combining gradually with the oxygen of the atmosphere, be ignited in pure oxygen gas, the combustion will be much more rapid, and the amount of heat generated greater, at the ordinary atmospheric pressure. If it be possible to burn the substance in a very condensed atmosphere of oxygen, we can readily imagine the combustion as very greatly accelerated, and therefore increased in violence; this is what is ordinarily effected by an explosive "mixture." A combustible body and a supporter of combustion are brought into extremely close contact with one another by means of intimate mechanical mixture; also, the supporter of combustion, or oxidizing agent, is present in very concentrated form, constituting what may be termed a magazine of condensed oxygen, solid or liquid. In the case of the explosion of a definite chemical compound, the change may be considered as the resolution of a complex body into simpler forms. This is not, however, always the case when a mechanical mixture is concerned; gunpowder, for example, may be said to contain two elementary substances, carbon and sulphur, not in chemical union.

The chief explosive mixtures may be subdivided into "nitrate mixtures" and "chlorate mixtures." In the nitrates, the oxygen is held in combination with sufficient force to need a powerful disturbing cause to separate it, so that mixtures made from nitrates do not explode very rapidly, and their action is comparatively gradual; they are not sensitive to friction or percussion, and hence are to a great extent safe. Any of the nitrates will form explosive mixtures with combustible substances, but nitrate of potash (KNO_3) is the only one practically employed. The nitrate of soda, called "cubical" or Chili saltpeter, has been used, but absorbs moisture from the air so readily as to give very inferior results. Gunpowder may be taken as the representative of the nitrate explosive mixtures. Picric powder, above referred to, has been proposed by Abel for use as a bursting charge for shells, as being more powerful than a corresponding charge of gunpowder, equally safe as regards friction or percussion, and less hygroscopic; it consists of two parts ammonium picrate, and three parts saltpeter, incorporated, pressed, and finished very much as ordinary gunpowder.

The chlorates part with their oxygen far more readily than the nitrates, the strong affinities of chlorine for the metals coming into play, and consequently chlorate mixtures are very sensitive to friction and percussion, and explode with great violence; chlorate of potash, ($KClO_3$) is the only one used. Very many chlorate mixtures have been made, some of which are employed in fireworks. "White gunpowder" is a mixture of two parts chlorate of potash, one of yellow prussiate of potash, and one of sugar; it is exploded very easily by friction or percussion. The most important chlorate mixtures are those used for igniting other explosives, such as the composition for friction tubes for firing cannon, percussion-cap composition, and percussion fuses for bursting shells on impact; it is sometimes mixed with sulphur, as a combustible, and sometimes with black sulphide of antimony, which gives a longer flame.

In an explosive "compound," the elements are all in chemical combination, presenting a definite explosive "molecule," which contains, so to speak, both the combustible and the supporter of combustion, in the closest possible union; we can therefore understand its action being much more sudden and violent than that of the most intimate mechanical mixture. The chief explosive compounds are formed from some organic substance containing carbon, hydrogen, and oxygen, by introducing into it, through the action of concentrated nitric acid, a certain portion of nitric peroxide (NO_2), in substitution for an equivalent amount of hydrogen. A new compound, differing outwardly very little, if at all, from the original substance, is thus formed, but in a very unstable state of chemical equilibrium, because of the feeble union of the nitrogen

and oxygen in the NO_2 molecule. A slight disturbing cause brings into play the stronger affinity of the carbon and hydrogen for the large store of oxygen contained in the new compound. Gun-cotton and nitro-glycerine are the leading members of this group, being produced in a precisely similar manner, by the substitution of three molecules of NO_2 for three atoms of hydrogen (H). As those explosives will be elsewhere described in detail, we give the formation, as a representative member of the group, of nitro-phenol, or picric acid, by treating phenol, or carbolic acid, with a mixture of nitric and sulphuric acids, the latter being required to absorb the water and preserve the full strength of the nitric acid:

Carbolic acid.		Nitric acid.		Picric acid.		Water.
C_6H_6O	+	$3HNO_3$	=	$C_6H_3(NO_2)_3O$	+	$3H_2O$

The formula of the product may be empirically written $C_6H_3N_3O_7$; it is, like gun-cotton and nitro-glycerine, a *tri-nitro* substitution product. Only the picrates, or salts of picric acid formed with potassium or ammonium, are used in practice, as possessing more force than the uncombined acid. From starch may be obtained, in a strictly analogous manner, an explosive called *xyloidine*, which is a *bi-nitro* product, two molecules of nitric peroxide being substituted for two atoms of hydrogen. In the case of *nitro-mannite*, an explosive made from mannite, one of the sugars, as many as six molecules of the NO_2 are inserted. The number of nitro-substitution products is very great, many of them being more or less violently explosive. The fulminates are among the most violent of all explosive compounds, their chemical sensibility being very small. Sudden in action, their effect is great locally; thus they are well adapted to the purpose, for which alone they are practically used, of igniting or upsetting the equilibrium of other explosives. Fulminate of mercury is produced by adding alcohol (C_2H_6O), under great precautions, to a solution of mercury in nitric acid; a gray crystalline precipitate is obtained, very heavy (sp. gr. 4.4), and so sensitive to friction or percussion that it is kept in the wet state. The results of analysis show one atom of mercury, and two each of carbon, nitrogen, and oxygen; so that the formula may be empirically written $HgC_2N_2O_2$, or perhaps more correctly $HgO.C_2N_2O$; the chemical factor C_2N_2O is called *fulminic acid*, but has never been produced separately. Opinions differ as to the precise "rational" formulæ of the fulminates, some chemists considering their process of formation to be similar to that of the nitro-substitution products. It will be observed that two atoms of nitrogen take the place of hydrogen, being the ratio of combining proportions of those elements. The products of combustion are carbonic oxide, nitrogen, and metallic mercury, and the violence of action is due to the sudden evolution of a volume of gas and vapor very large in comparison with that of the substance, its density being so great. This fulminate enters into the composition used for percussion caps and electric fuses; its practical value has of late years been immensely increased by the discovery of its power, even in very small quantities, to produce the almost instantaneous decomposition of several explosive substances. Fulminate of silver is prepared in a similar manner, but, being far more sensitive, is of little practical value; it is employed, in very minute quantities, in making such toys as detonating crackers.

It may be generally concluded that the amount of force exerted by an explosive substance depends upon (1) the *volume of gas or vapor* produced by the transformation, compared with that of the original substance; and (2) the *temperature of explosion*, which determines the extent to which the gases are expanded, or their tension increased; or, in other words, the explosive force is directly proportional to the heat of combustion, and the volume of gas and vapor calculated at 0° C. and 7.60 mm. pressure, and *inversely* proportional to the specific heat of the mixed products. It has been supposed by Berthelot and others that the volume of gas produced may possibly be still further increased by the partial or total "dissociation" of the compound gases, at the high temperatures concerned; for example, that the carbonic acid (CO_2) may be decomposed into carbonic oxide (CO) and oxygen, or the aqueous vapor into oxygen and hydrogen. However, Nobel and Abel demonstrate that, in the former instance, the loss of temperature, consequent upon the absorption of heat by the decomposition, would more than compensate for the increase of volume by dissociation. It must also be remembered that, if the temperature be extremely high, so also is the pressure under which dissociation must take place. We may therefore consider that it has no sensible influence upon the explosive force.

It is most important to distinguish between explosive force and explosive effect, the latter in great measure depending upon the rapidity with which the metamorphosis takes place, while the same amount of force may be exerted suddenly or gradually. We may, therefore, consider that the explosive effect varies *directly* as the volume of gas produced and the temperature of explosion, and *inversely* as the time required for the transformation. But the time, and, to a certain extent, the products and temperature, will vary with (*a*) the physical state of the explosive substance; (*b*) the external conditions under which it is fired; (*c*) the mode of firing or exploding.

The physical or mechanical state of the explosive substance has a most important bearing upon the effect obtained from it. To prove this, it is only necessary to point to the very different results given by gunpowders made with the same proportions of the three ingredients, but varying in density, and in shape and size of grains or pieces.

Gun-cotton is even more affected by variations in mechanical condition. In the form of loose wool, it burns so rapidly that gunpowder in contact with it is not inflamed; plaited or twisted tightly, its rate of combustion in air is greatly modified. This is due to the fact that the inflammable carbonic oxide, which is evolved by the decomposition from the want of sufficient stored-up oxygen to oxidize completely all the carbon of the gun-cotton, cannot penetrate between the fibers and accelerate the combustion, but burns with a bright flame away from the surface of the twisted cotton: when the yarn is yet more compressed by any means, the temperature is not kept up to the height necessary for the combustion of the carbonic oxide, so that it escapes unconsumed, abstracting heat, and yet more retarding the rate of burning. For the same reason, pulped and compressed gun-cotton burns comparatively slowly in air, even when dry; in the wet state, it merely smolders away, as the portion in contact with the fire successively becomes dried. Yet this same wet compressed gun-cotton can be so used as to constitute one of the most powerful explosives known.

It is well known that gunpowder behaves differently when in the open air and under strong confinement; not only the rate of burning, but even, to a certain extent, the products of combustion are altered. We have discussed the effect of tightly plaiting or compressing gun-cotton; but when confined in a strong envelope, the whole of the inflamed gas, being unable to escape outwards, is forced into the interstices under immense pressure, and the decomposition is greatly accelerated. The amount of confinement or restraint needed by any explosive depends, however, upon the nature of the substance and the mode of exploding it, becoming very much less as the transformation is more rapid, until it may be said to reach the vanishing-point. For example, the very violent explosive chloride of nitrogen is usually surrounded, when exploded, with a thin film of water. Abel states that if this film, not exceeding $\frac{1}{1000}$ in. in thickness, be removed, the explosive effect is much lessened. Nitro-glycerine, again, when detonated by a fulminate, is sufficiently confined by the surrounding atmosphere. By the same means, gun-cotton may be exploded unconfined, if compressed, the mechanical cohesion affording sufficient restraint. In the case of wet compressed gun-cotton, which can be detonated with even fuller effect than dry, the mechanical resistance is greater, the air-spaces being filled with incompressible fluid.

The manner in which the explosion is brought about has a most important bearing upon the effect produced. This may be done by the direct application of an ignited or heated body, by the use of an electric current to heat a fine platinum wire, or by means of percussion, concussion, or friction, converting mechanical energy into heat. A small quantity of a subsidiary explosive, such as a composition sensitive to friction or percussion, is often employed, for the sake of convenience, to ignite the main charge, the combustion spreading through the mass with more or less rapidity, according to the nature of the substance.

Although subsidiary or initiatory explosives were at first used merely to generate sufficient heat to ignite the charge, and are often still so employed, they have of late years received an application of far wider importance. Mr. Alfred Nobel, a Swedish engineer, while endeavoring to employ nitro-glycerine for practical purposes, found considerable difficulty in exploding it with certainty; he at length, in 1864, by using a large percussion cap, charged with fulminate of mercury, obtained an explosion of great violence. This result led to the discovery that many explosive substances, when exploded by means of a small quantity of a suitable initiatory explosive, produce an effect far exceeding anything that can be attributed to the ordinary combustion, however rapid, of the body in question; in fact, the whole mass of the explosive is converted into gas with such suddenness that it may, practically, be considered instantaneous. This sudden transformation is termed "detonation." Of the substances capable of producing such action, fulminate of mercury is the most important.

Some explosives appear always to detonate, in whatever manner they may be exploded, such as chloride and iodide of nitrogen; the explosive effect is therefore much greater than that of a slower explosive substance, although their explosive force may be less. Again, other substances, such as gun-cotton and nitro-glycerine, are detonated or not, according to the mode of explosion. Indeed, Abel has proved that most explosives, including gunpowder, can be detonated, provided the proper initiatory charge be employed. Roux and Sarrau have divided explosions into two classes or orders—"detonations" or explosions of the first order, and "simple explosions" of the second order. They made a series of experiments with the object of determining the comparative values of various explosive substances, detonated, and exploded in the ordinary manner; the method employed was to ascertain the quantity of each just sufficient to produce rupture in small spherical shells of equal strength. The following table gives the comparative results for the three most important explosive substances:

	Explosive Effect—	
	Second Order.	First Order.
Gunpowder	1 00	4 34
Gun-cotton or nitro-cellulose	3 00	6 46
Nitro-glycerine	4 80	10 13

These experiments, although valuable, cannot be considered as affording a precise method of comparison; the results would be affected, *inter alia*, by the impossibility of

insuring that the shells were all of the same strength, a point of great importance, considering the very small weights of each explosive used; also, the rate of combustion, and therefore the explosive effect of gunpowder, is materially affected by its mechanical condition, so that different powders would give a varying standard of comparison. However, they afford fair evidence that, when detonated, gun-cotton has about six times, and pure nitro-glycerine about ten times the local explosive effect of gunpowder simply ignited in the ordinary manner; nitro-glycerine is usually employed in the form of "dynamite," mixed with some inert absorbent substance, so that its power is proportionately reduced.

The rationale of detonation is not yet understood. If the transformation were due merely to the mechanical energy of the particles of gas, liberated from the initiatory charge at a tremendous velocity, being converted into heat by impact against the mass of the explosive substance, then it would follow that the powerful explosive would be the best detonating agent. This, however, is not the fact; for a few grains of fulminate of mercury in a metal tube will detonate gun-cotton, whereas nitro-glycerine, although possessed of more explosive force, will not do so unless used in large quantities. The fact of its being possible to detonate wet gun-cotton is also a proof that the action cannot be due to heat alone. It would rather seem to be what prof. Bloxam terms "sympathetic" explosion. The experiments of Abel, as well as those of Champion and Pellet in France, appear to indicate a vibratory action of the detonating agent upon the ultimate particles of the substance to be exploded. An explosive molecule is most unstable, certain very delicately balanced forces preserving the chemical and physical equilibrium of the compound. If these forces be rapidly overthrown in succession, we have explosion; but when, by a blow of a certain kind, they are instantaneously destroyed, the result is detonation. Just as a glass globe may withstand a strong blow, but be shattered by the vibration of a particular note, so it is considered by some authorities that, in the instance cited, the fulminate of mercury communicates a vibration to which the gun-cotton molecule is sensitive, and which overthrows its equilibrium; it is not sensitive to the vibrations caused by the nitro-glycerine, which only tears and scatters it mechanically. Although the action of detonation has been spoken of as instantaneous, and may practically be so considered, yet a certain infinitesimal duration of time is required for the metamorphosis; different substances possess, doubtless, different rates of detonation, for we can scarcely conceive of a mechanical mixture, such as gunpowder, being so sensitive to the action of the detonating impulse as a definite chemical compound, and the rate even varies slightly, for the same explosive, with its physical state. It has been shown by means of capt. A. Nobel's chronoscope, that compressed gun-cotton, when dry, is detonated at a velocity of from 17,000 to 18,000 ft. a second, or about 200 m. a minute; by using a small primer of dry gun-cotton, the same substance in the wet state may be detonated at the increased rate of from 18,000 to 21,000 ft. a second, or about 240 m. a minute.

The following table shows the potential energy, in foot-tons, calculated from the heat of combustion for each explosive, determined by Roux and Sarrau, in the experiments already referred to; that for gunpowder is the mean given by five kinds:

Explosive Substances.	Potential energy per lb. Foot-tons.
Gunpowder	480
Gun-cotton	716
Nitro-glycerine	1139
Picrate of potash	536
Picrate of potash and saltpeter	615
Picrate and chlorate of potash	781
Chloride of nitrogen	216

The above figures naturally direct our attention to the small amount of work stored up in even the most violent explosive substance, compared with the potential energy of 1 lb. of coal, which is about 4,980 foot-tons. Nobel and Abel point out that this great difference is due not alone to the fact that the coal draws its oxygen from the air, but also to the necessity that the explosive should expend a considerable amount of work in converting its condensed magazine of oxygen into gas, before it can combine with the carbon; further, with reference to the economical value of the work done, that the oxygen used by the coal costs nothing, whereas much expense is incurred in condensing the oxygen into the explosive substance.

The practical value of any explosive must depend greatly upon the object to be attained. It is essential to distinguish between explosive force and effect; the more sudden the action the more local will be the effect produced, and hence the very violent explosive substances are useless as propelling agents for heavy guns or small arms, since they would destroy the weapon before overcoming the inertia of the projectile. It is true that gun-cotton, prepared in various forms, and mixed with other substances to moderate its action, as well as a similar compound made from sawdust, an inferior form of cellulose, are sometimes used with small arms; but, in addition to a want of uniformity in action, the strain caused by such substances would be far too great in the large charges needed for heavy guns. Again, there are cases, even in mining or blasting

operations, for instance, when it is desired to displace large masses of earth or soft rock, in which a comparatively slow explosive, such as gunpowder, would give better results than gun-cotton or dynamite. However, speaking generally, gunpowder in some one of its forms is far the most valuable as a propelling agent, while for destructive purposes, the last named substances are much more effective, especially when detonating.

The various explosives in common use are gunpowder in various forms; gun-cotton; nitro-glycerine; dynamite, or giant powder, and dualin. Others less used are Schultze powder, glyoxiline, lithofractor, Brugiere's powder, the chlorates, and the picrates. See GUNPOWDER, *ante;* NITRO-GLYCERINE, *ante.* Dualin was invented soon after dynamite. The patent describes it as consisting of "cellulose, nitro-cellulose, nitro-starch, nitro-mannite, and nitro-glycerine, mixed in different combinations, depending on the degree of strength desired in adapting its use to various purposes." A sample supplied by the inventor for trial at the Hoosac tunnel was found by analysis to consist of 60 per cent of nitro-glycerine and 40 per cent of washed sawdust, not treated with nitric and sulphuric acids. The best variety now manufactured is believed to be cellulose derived from poplar pulp, treated with nitric and sulphuric acids, and saturated with nitro-glycerine.

Having a less specific gravity than dynamite, dualin is inferior to it, bulk for bulk, in explosive energy. When soaked in water, it can be exploded only by a violent detonation, exceeding that of the ordinary fuse, and even then it loses more than half its power. It congeals at about 45° Fahrenheit, and in this state readily explodes, becoming so sensitive to friction as to make it dangerous to use in cold weather. In other respects its properties resemble those of dynamite.

Laws.—There are laws in most of the states regulating the storage and transportation of explosives, and city corporations and boards of underwriters have strict ordinances and rules on the same subjects. [This article is mainly an abridgment from *Encyclopædia Britannica,* ninth edition.]

EXPO'NENT AND **EXPONEN'TIAL.** When it was wanted to express the multiplication of unity for any number of successive times by the same number or quantity, e.g., $1 \times 5 \times 5$, or $1 \times a \times a \times a$, it was found a convenient abbreviation to write 1×5^2 and $1 \times a^3$, or simply 5^2 and a^3; and the numbers, 2 and 3, indicating how often the operation of multiplication is repeated, were called exponents. But the theory of exponents gradually received extensions not originally contemplated, and has now an extensive notation of its own. Thus, $a^0 = 1$, $a^1 = a$, $a^{-2} = \frac{1}{a^2}$, $a^{\frac{1}{2}} = \sqrt{a}$, $a^{\frac{1}{3}} = \sqrt[3]{a}$, $a^{\frac{2}{3}} = \sqrt[3]{a^2}$, or the cube root of the square of a. Also a^x is the xth power of a, x being any number integral or fractional; and, a continuing the same, x may be so chosen that a^x shall be equal to any given number. In this case, x is called the logarithm of the number represented by a^x. Considered by itself, a^x is an exponential. Generally, any quantity representing a power whose exponent is variable, is an exponential, as a^x, x^x, y^x, etc. Exponential equations are those which involve exponentials, such as $a^x = b$, $x^x = c$.

EXPORTS. See IMPORTS and EXPORTS.

EX POST FACTO, in law, an act that operates retrogressively; a law passed after the commission of an act by which such an act may be punished. The constitution of the United States prohibits the passage of such laws, either by congress or by any other legislative body. Chief-Justice Marshall defines an *ex post facto* law to be one which rendered an act punishable in a manner in which it was not punishable when it was committed. Various decisions of the courts make this definition more specific, and hold as *ex post facto* any law which makes criminal an act which, done before its passage, was innocent; any law which makes a crime greater than it was at the time of commission; any law which inflicts punishment greater than was affixed to a crime when committed; any law which changes the rules of evidence as to an offense already committed and to the prejudice of a defendant. The constitutional prohibition of *ex post facto* laws applies to criminal and penal statutes only, and not to those which simply affect property.

EXPOSURE OF **INFANTS.** See INFANTICIDE.

EXPRESS, a business which has grown within the past quarter of a century to enormous importance. It was in the spring of 1839 that William F. Harnden advertised to take charge of money and small parcels to transmit between Boston and New York, and from his single carpet-bag has risen a system of inter-communication between places and persons that, for numbers of stations and length of route, is surpassed only by the post-office department. The all-embracing express reached across the ocean as early as 1855, and now this peculiar American institution extends literally to the ends of the earth. The most valuable articles are sooner intrusted to a responsible express than to government mails, for, in addition to ever-increasing care, there is a system of package insurance which secures the owner in almost any case of loss. The express business is too well known to need any particular description. It is estimated that the American express companies alone cover about 75,000 m. of road; make a travel of 400,000 m. per day; employ over 20,000 men, 4,000 horses, and have from 9,000 to 10,000 offices. A large proportion of the business is the collection of small sums for merchants, the C. O. D. packages implying "collect on delivery" the sum marked on the package as due.

EXPRESSIO NĒ, CON. or EXPRESSIVO, Italian terms in music, meaning with expression; impassioned, with pathos. Where the word appears at the beginning of a composition, the piece must be executed throughout with feeling. "Expressioné" frequently appears above certain passages which alone are to be performed so, while the harmony in the accompaniment goes on quietly.

EXTENSION, in logic, is a word put into contrast with another term, COMPREHENSION, and the two mutually explain each other. A general notion is said to be extensive according to the extent of its application, or the number of objects included under it. Thus, figure is a term of very great extension, because it contains in its compass many varieties, such as round, square, oblong, polygonal, etc. In like manner, European is more extensive than German, man than European, animal than man, organized being than animal. The highest genera are formed by taking in a wider range of objects. Matter and mind are the most extensive classes that we can form. For, although a higher genus is sometimes spoken of, viz., existence; to call this a class is to generalize beyond real knowledge, which does not begin till we have at least two actual things to contrast with each other. What can be contrasted only with non-existence, non-entity, or nothingness, is not genuine knowledge: no property can be affirmed of it apart from the thing itself. Matter, in its contrast to mind, is a real cognition; and *vice versâ*, mind in its contrast to matter. These, then, are the most extensive terms that have any real knowledge attached to them. But this property of E. is gained by dropping more and more of the peculiarities of the included individuals; "organized being," in order to include both plants and animals, must drop from its signification what is peculiar to each, and mean only what is common to both. In short, these very extensive notions have a very *narrow* signification; it is the less extensive that have most meaning. The meaning of "man," or the number of attributes implied in this generic expression, is large. Everything that goes to a human being—the human form and organization, the mental attributes of reason, speech, etc.—is expressed by this term, which is on that account said to be more COMPREHENSIVE than animal or organized being. Thus it may be seen that the greater the E., the less is the comprehension; and the greater the comprehension, the less is the extension. An individual name is the term of greatest comprehension, and of least extension. "Socrates" comprehends all that is common to men and to philosophers, together with all that is peculiar to himself. On the logical uses of this distinction, see sir W. Hamilton's *Lectures on Logic*, i. 140.

EXTENT, in English law, a writ issuing out of the court of exchequer to compel payment of debts to the crown. In order to warrant the issue of this writ, the debt must be a debt of record (q.v.). Extents are in chief or in aid. The former are issued against the crown debtor, and under it the body, land, and goods may all be taken at once. An extent in aid is issued at the suit of a crown debtor against a person indebted to the crown debtor. On this writ, the chattels only of the person against whom it is issued can be attached. Writs of extent in aid were at one time made the means of great abuse; persons who were not crown debtors were in the practice of assigning debts to the crown, and thereupon obtaining a writ in aid. This practice was stopped by 7 James I. c. 15, forbidding assignments to the crown. Persons then resorted to other means, such as taking the debt in name of the crown, or getting themselves appointed bailiffs for the crown, and in that character procuring the issue of the writ. At last, the practice was finally stopped by 57 Geo. III. c. 117, by which it is enacted that the amount of the crown debt shall be indorsed on every extent in aid, and that any overplus beyond the crown debt shall be paid into court to be disposed of as the court shall direct. By the treaty of union, extents were introduced into Scotland on revenue matters; but the sheriff is only entitled to take the debtor's movables.

EXTENT (in Scotland). There were no taxes in feudal times. The king was supported by the rents of his property lands, and by the occasional profits of superiority—ward, non-entry, marriage, escheat, and the like—which were known by the general name of casualties (q.v.). Beyond these, and the expenses which the discharge of his ordinary duties to his superior imposed on him, the vassal was not liable to be taxed. But to this rule there were some exceptions. When it became necessary to redeem the king from captivity, to provide a portion for his eldest daughter, or to defray the expense of making his eldest son a knight, a general contribution was levied. One of these occasions occurred when Alexander III. betrothed his daughter Margaret to Eric, the young king of Norway, and engaged to give her a tocher of 14,000 merks. This sum was far beyond the personal resources of the king, and consequently fell to be levied by a land-tax—land and its fruits being then the only appreciable species of property. But if the tax was to be levied fairly and equally, this could be done only by ascertaining the value of the whole lands in the kingdom, as had been done in England in the time of Edward I. (4 Edw. I. i. anno 1276). Whether this was the first occasion on which a general valuation of all the lands of Scotland had been made, as lord Kames thought (*Law Tracts*, tract xiv.), or whether there had been earlier valuations of the same kind, as others have supposed (Cranston *v.* Gibson, May 16, 1818, Fac. Coll.), is still a subject of dispute amongst antiquaries. It is certain, however,

that the valuation here spoken of was long known as *the old extent*. As such, it is spoken of in the act of indenture of 15th July, 1336, by which the parliament of Scotland agreed to give to king Robert Bruce the tenth penny of all the rents of the laity during his life. In this latter act it was provided that such lands as had been wasted by the war should be revalued by an inquest before the sheriff, and the retour, or formal verdict, was so framed as to contain a statement both of the present value of the lands, and of what they were worth "in the time of peace." In almost all cases, the new was considerably under the old valuation, a fact which shows how widespread must have been the devastation of that terrible war. The same deplorable fact is brought out by the E. taken with a view to raise the sum necessary for the ransom of David II. On this occasion, the new E. of the temporal lands scarcely amounted to £25,000, whereas the old E. exceeded £50,000 (Cranston *v.* Gibson, *ut sup.*). But this state of matters was reversed when James I. succeeded in restoring peace and prosperity. Indeed, even before the influence of his personal qualities could have been felt, the condition of the country must have improved, because the E. which was taken in 1424, for the purpose of redeeming him from captivity, shows in general an advance upon that even of the time of Alexander III. In several later cases (1481, 1488, 1535), in which grants were made to the crown, the assessments were levied from temporal lands by a series of new extents, according to present value. During the minority of Mary, the assessments, which were heavy and numerous, were levied according to an old E., but it is doubtful whether it was the E. of Alexander III., or of David II., or a later one than either. The extents of which we have spoken did not apply to church lands. The share of the subsidies applicable to them was levied according to the value of the benefices as settled by "Bagimont's Roll," which was made up in the time of Alexander III. by Benemundus de Vicci, vulgarly called Bagimont. Cromwell introduced a more equitable rule of assessment, and fixed precisely the ratio to be laid upon each county; and his system was adhered to, with little variation, after the restoration (act of convention, 23d January, 1667). The rent fixed by these valuations, commonly called the valued rent, was that according to which the land-tax and most of the other public and parochial asssessments were imposed till the passing of the recent valuation acts, 17 and 18 Vict. c. 91, 1854, and 20 and 21 Vict. c. 58, 1857. See VALUATIONS OF LAND.

EXTRACTION OF ROOTS. See EVOLUTION. The roots which have in practice to be most frequently extracted are the *square* and *cube* roots. It is proposed to explain the rule for their extraction as it is given in books of arithmetic. And first of the square root. The square of $a + b$ is $a^2 + 2ab + b^2$, and we may obtain the rule by observing how $a + b$ may be deduced from it. Arranging the expression according to powers of some letter a, we observe that the square root of the first term is a.

$$\begin{array}{rll} & a^2 + 2ab + b^2 (a + b \\ & a^2 & \\ \hline 2a + b) & 2ab + b^2 & \\ & 2ab + b^2 & \\ \hline \end{array}$$

Subtract its square from the expression, and the remainder is $2ab + b^2$. Divide $2ab$ by $2a$, and the result is b, the other term in the root. Multiply $2a + b$ by b, and subtract the product from the remainder. If the operation does not terminate, it shows that there is another term in the root. In this case, we may consider the two terms $a + b$ already found as one, and as corresponding to the term a in the preceding operation; and the square of this quantity having been by the preceding process subtracted from the given expression, we may divide the remainder by $2(a + b)$ for the next term in the root, and for a new subtrahend multiply $2(a + b) +$ the new term, by the new term; and the process may be repeated till there is no remainder. The rule for extracting the square root of a number is an adaptation of this algebraical rule. In fact, if the number be expressed in terms of the radix of its scale, it is seen to be a concealed algebraical expression of the order we have been considering. Thus, $N = ar^n + br^{n-1} + \ldots + q$. The number 576 in the denary scale may be written $5 \times 10^2 + 7 \times 10 + 6$; and treating it as an algebraical expression, we should find its root to be $2 \times 10 + 4$, or 24. The only part of the arithmetical rule now requiring explanation is the rule of pointing. As every number of one figure is less than 10, its square must be less than 10^2; generally, every number of n figures is less than 10^n (which is 1 followed by n ciphers); but also every number of n figures is not less than 10^{n-1}, and therefore its square is not less than 10^{2n-2}—which is the smallest number of $2n - 1$ figures. Also, 10^{2n} is the smallest number of $2n + 1$ figures. It follows that the square of a number of n figures has either $2n$ or $2n - 1$ figures. If, then, we put a point over the units place of a number of which the root is to be extracted, and point every second figure from right to left, the number of points will always equal that of the figures in the root. If the number of figures be even, the number will be divided into groups of two each; if odd, the last group will contain only a single figure.

The rule for the extraction of the cube root of a number is deduced from that for

the extraction of the cube root of an algebraical expression in the same way as in the case of the square root. The cube of $(a + b)$ is

$$a^3 + 3a^2b + 3ab^2 + b^3 (a + b$$

$$a^3$$

$$3a^2) \quad 3a^2b + 3ab^2 + b^3$$
$$3a^2b + 3ab^2 + b^3$$

Hence the rule in algebra. Arrange the expression according to descending powers of a, the cube root of the first term a^3 is a, the first term of the root. Subtract its cube from the expression, and bring down the remainder. Divide the first term by $3a^2$, and the quotient is b, the second term of the root. Subtract the quantity $3a^2b + 3ab^2 + b^3$. If there is no remainder, the root is extracted. If there is, proceed as before, regarding $a + b$ as one term, corresponding to a in the first operation. Let, for example, $a + b = a^1$, then $3a^{1\,2}$ is the new trial divisor. If c be the new term or third figure of the root, then the quantity to be subtracted to get the next remainder is $3a^{1\,2}c + 3a^1c^2 + c^3$, and so on till there is no remainder. The rule of pointing in the extraction of the cube root may be proved, as in the case of the square root, by showing that the cube of a number of n figures contains $3n$, $3n - 1$, or $3n - 2$ figures; and, therefore, if we put a point over the units place, and on each third figure, we shall have as many periods as there are figures in the root.

It may be observed that a rule for the extraction of any root of a number may be got from considering how, from the expansion of $a + b$ to the nth power, or $a^n + na^{n-1}b +$, etc., the root $a + b$ is to be obtained. See EVOLUTION and INVOLUTION.

EXTRACTIVE MATTER is the term applied to certain organic matters resembling humine, found in soils during the decay of vegetable matter, and which are precipitated during the concentration of water solutions.

EXTRACT OF MEAT is obtained by acting upon chopped meat by cold water, and gradually heating, when about one-eighth of the weight of the meat dissolves out, leaving an almost tasteless insoluble fibrine. The extract of meat contains the savory constituents of the meat, and is a light nutritious article of food. See BEEF-TEA and BROTH. It may be concentrated into small bulk, and when desired, may be afterwards treated with water, and being heated, forms an agreeable, light, and nutritive soup. See PRESERVES.

EXTRACTS, in a technical sense, are medicinal preparations of vegetable principles, got either by putting the plants in a solvent or menstruum, and then evaporating the liquid down to about the consistency of honey, or by expressing the juice of the plants and evaporating; this last is properly *inspissated juice*. E., therefore, contain only those vegetable principles that are either held in solution in the juices of the plants themselves, or are soluble in the liquid employed in extracting them, and at the same time are not so volatile as to be lost during evaporation. Now, as many extractive matters are more or less volatile, it makes a great difference whether the operation is conducted at a low or at a high temperature. E. are called *watery* or *alcoholic* according as the menstruum employed is water or spirits. Ether is also used in extracting. Different plants of course afford different E., some being of the nature of bitters, others being used as pigments, tannin, etc. E. are liable to great uncertainty in point of strength and composition, and require to be prepared with great care. Evaporation in vacuo is found to be a great improvement.

EXTRADI'TION, the giving up, by authority of law, a person accused of a crime, to the foreign jurisdiction within which it was committed, in order that he may be tried there. E. is always the subject of international treaty. A treaty or convention for this purpose was entered into between this country and France in 1843, and between this country and the United States of America in 1842. Nearly all other states have done likewise. The crimes for which E. is allowed were settled by the E. act 1870, 33 and 34 Vict. c. 52, and include murder, manslaughter, coining, forgery, larceny, false pretenses, bankruptcy offenses, rape, abduction, child-stealing, burglary, arson, robbery, threats to extort money, sinking of ships, revolt and assaults in ships; but there is no surrender if the offense is one of a political character. The surrender is effected through the intervention of the secretary of state, and it is by the secretary's warrant that he is finally handed over with the depositions to the foreign state making the requisition.

EXTRADI'TION (*ante*), in the United States. The federal constitution provides that "a person charged in any state with treason, felony, or other crime, who shall flee from justice and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up to be removed to the state having jurisdiction of the crime." As to foreign countries, E. is regulated by special treaties, and the United States has such treaties with Great Britain, France, the Hawaian islands, most of the states now forming the German empire, and with that empire, Austria, Sweden and Norway, Italy, Switzerland, Venezuela, the Dominican republic, Nicaragua, Hayti, and Mexico. These treaties provide for E. in cases of the higher crimes,

such as murder, assault with intent to kill, piracy, arson, robbery, forgery, rape, embezzlement by public officers, burglary, etc. Proceedings in cases of E. are carefully defined and guarded by law. Political offenders, even though making war upon their own government, are not subject to extradition. There are some treaties made between the United States and several Indian tribes, recognized as nations or distinct communities, in some of which the Indians have stipulated to surrender to the federal authorities persons accused of crimes against the laws of the United States.

EXTRAVAGAN'TES CONSTITUTIO'NES, papal constitutions of John XXII. and some of his successors, supplemental to the "Corpus Juris Canonica." They got their name from the fact that they were not arranged in order with the other constitutions, but were "outside wanderers" from the general code.

EXTRAVASA'TION is the escape of any of the fluids of the living body from their proper vessels (*vas*) through a rupture or injury in their walls. Excrementitious matter thus sometimes escapes into the abdomen through a wound or ulceration of the bowels. But the term is oftenest used in speaking of the escape of blood from injured blood-vessels. E. is distinguished from exudation by this, that in the last the vessels remain entire, and the effusion takes place by filtration through their walls; nor does more than a part of the blood so escape, the blood gobules being retained, while in E. perfect blood is effused. Many kinds of E. are immediately fatal, such as that of urine or of gall into the abdomen, or of blood from the vessels of the brain in many cases of apoplexy. The dark color resulting from a bruise is owing to extravasated blood from ruptured capillary vessels.

EXTREME UNCTION, a sacrament of the Roman Catholic church, which, as the other sacraments supply spiritual aid in the various circumstances of life, is believed to impart to the Christian in death grace and strength to encounter the struggle, as well spiritual as bodily, of the dying hour. The right of unction in different forms is common to several of the sacraments; the name "extreme" is given to that of the present sacrament, because it is reserved for the last act of the Christian career. The council of Trent declares this sacrament, although "promulgated" in the well-known passage of St. James v. 14, 15 (which Protestants regard as having more to do with the general belief in the sanative properties of oil), to have been "instituted" by Christ. The fathers frequently allude to the right of unction, and although many of these allusions certainly refer to the unctions of baptism and confirmation, yet Catholics rely on several passages of Origen, Chrysostom, Cæsarius of Arles, and pope Innocent I., as decisive regarding the unction of the dying, as also upon the fact that in the various separated churches of oriental Christians—Greek, Coptic, Armenian, and Nestorian—the rite is found, although with many ceremonial variations. In the Roman Catholic church, the sacrament is administered by the priest, who, "dipping his thumb in the holy oil, anoints the sick person, in the form of the cross, upon the eyes, ears, nose, mouth, hands, and feet; at each anointing making use of this form of prayer: 'Through this holy unction, and his most tender mercy, may the Lord pardon thee whatever sins thou hast committed by thy sight. Amen." And so of the hearing and the rest, adapting the form to the several senses."—Challoner's *Catholic Christian Instructed.* E. U. is reputed by Catholics one of the sacraments "of the living;" that is, it ordinarily requires that the recipient should have previously obtained remission of his sins by absolution or by perfect contrition; but it is held to remit, *indirectly*, actual sins not previously remitted, and also (although not infallibly, but according to the merciful designs of Providence) to alleviate, and even to dispel, the pains of bodily disease. The holy oil which forms the "matter" of this sacrament must be blessed by the bishop—a ceremony which is performed with great solemnity once each year by the bishop, attended by a number of priests, on Maundy-Thursday. The oil so blessed is reserved for use during the year. In the Greek church, the sacrament is administered by several priests conjointly. In its most solemn form, seven priests unite in its administration; in ordinary circumstances, it is conferred by two. The Greek form of words also differs, although not substantially, from that of the Latin church. The Greeks call this sacrament "the holy oil," and sometimes "the oil of prayer."

EXTREMITY. See SKELETON.

EXUMAS, comprising Great Exuma, Little Exuma, and the Exuma Keys, form part of the group of the Bahama islands. They contain about 2,000 inhabitants, who are employed partly in agriculture, including at one time the growing of cotton, but chiefly in salt-making. In the last-named business, the E. rank second among all the subdivisions of the group. They have exported as much as 116,000 bushels of salt a year. Next to Nassau in New Providence, Little Exuma is the most considerable port of entry in the Bahamas.

EXU'VIÆ, a term applied to organic remains, now seldom employed, but frequently used by the older geologists.

EYALET, or VILAYET, is the largest and most important of the administrative divisions of the Turkish empire, formerly known as pashalics. These are again divided into *livas* or *sanjaks*, the livas into *cazas* or districts, and the cazas into *nahiés* or communes, containing villages or hamlets. Each E. or general government, as it may be

called, is administered by a pasha, who is governor, and the general name for whom is *vali* or viceroy. The governors of the eyalets belong to the dignities of the sword, and are pashas of two tails; and when they are raised to the rank of vizier, as is frequently the case, they become pashas of three tails.

EYCK, HUBERT and JAN VAN, two illustrious painters of the old Flemish school. Much discussion has arisen as to the time of the birth of these brothers, and the various dates assigned range from 1350 to 1400. Some maintain that Hubert was born in 1366, and Jan in 1370; while Kugler—in general a good authority on ancient art—states the dates to be 1366 and 1400, making Hubert 34 years older than Jan. Their birthplace was Maas-Eyck, and they chiefly resided at Bruges and Ghent, and became the founders of the Flemish school of painting. The honor of being the inventors of oil-painting is claimed for them, though sufficient evidence has been adduced to show that it was practiced previously. Before their time, the custom, however, particularly in Italy, was to paint with gums or other substances of an adhesive nature dissolved in water; and if not the inventors, they were at least the first who brought into notice and perfected the mode of mixing colors with oil or some medium of which oil was the chief ingredient; while, for transparent and brilliant coloring and minute finish, their works have never been surpassed. Till the death of Hubert, the brothers generally painted in conjunction: one of their most important works was an altar-piece with folding-doors, representing the Elders adoring the Lamb—a subject taken from the Apocalypse—painted for *Jodocus Vyts*, who presented it to the cathedral of St. Bavon, in Ghent. The two central divisions of this picture are all that now remain in the church at Ghent. Some of the wings are in the gallery at Berlin. The masterpieces of the brothers are for the most part in the cities of Ghent, Bruges, Antwerp, Berlin, Munich, and Paris. In the national gallery, London, there are three pictures of Jan van E., which, though small, well exemplify the high qualities of his works. These are portraits of a Flemish merchant and his wife, standing in the middle of an apartment, with their hands joined—signed and dated 1434: of the portrait of a man in a cloak and fur collar, with a red handkerchief twisted round the head as a turban—painted, according to an inscription on the lower part of the frame, Oct. 21, 1433: and portrait of a man with a dark-red dress, with a green head-covering—signed and dated 10th Oct., 1432. Hubert died in 1426, and Jan in 1441. Compare Waagen, *Ueber Hub. und Jan van Eyck* (Breslau, 1822).

EYCK, HUBERT VAN (*ante*), 1366–1426; the eldest of a remarkable Flemish family of painters. He gained his artistic reputation in Flanders. He was in the pay of Philip of Charolais until 1421. His masterpiece is "The Worship of the Lamb," the noblest creation of the Flemish school. This great composition is one of the chief illustrations of the solemn grandeur of art in the church of the 15th c.; correct in drawing, glowing in color, deeply earnest and simple, and instinct with religious sentiment.

EYCK, JAN VAN (*ante*), 1390-1440; brother of Hubert, and also a painter. He was, for nearly all his life under the patronage of Philip of Burgundy. He produced a great number of portraits and compositions, often working with his brother. Most of Jan's productions were of a high order of merit, lacking the modern scientific perspective and his brother's stern religious feeling, but with brilliance of color, fine gradation of tone minuteness of finish, and firmness of touch.

EYE, a parliamentary and municipal borough in Suffolk, 20 m. n. of Ipswich. Its streets are rather narrow and irregular. Pop. (1871) of municipal borough, 2,396; of parliamentary borough, 6,721. It sends 1 member to parliament, the parliamentary borough including 11 parishes. Eye, in Anglo-Saxon, means island; the river surrounding the town. Breweries, an iron-foundry, and a large flax manufactory furnish employment.

EYE, ANATOMY AND PHYSIOLOGY OF THE. In this article we shall consider: 1 The structure of the human eyeball, and of certain accessory parts or appendages which serve to protect that organ, and are essential to the due performance of its functions. 2. The most striking modifications which this organ presents in some of the lower animals. 3. The special uses of the various parts of the eye considered as an optical instrument; and 4. The action of the retina.

1. The *globe of the eye* is placed in the anterior part of the cavity of the orbit (q.v.), in which it is held in position by its connection with the optic nerve posteriorly, and with the muscles which surround it, and by the eyelids in front. It is further supported behind and on the sides by a quantity of loose fat, which fills up all the interstices of the orbit, and facilitates the various movements of which the eye is capable.

The form of the eyeball is nearly spherical; but on viewing the organ in profile, we see that it is composed of segments of two spheres of different diameters. Of these, the anterior, formed by the transparent cornea, has the smaller diameter, and is therefore the most prominent; and hence the antero-posterior slightly exceeds (by about a line) the transverse diameter. The radius of the posterior or sclerotic segment is about $\frac{13}{10}$ths, and that of the anterior segment about $\frac{8}{10}$ths of an inch.

When the eyes are in a state of repose, their antero-posterior axes are parallel; the optic nerves, on the other hand, diverge considerably from their commissure within the cavity of the skull to the point where they enter the globe; consequently, their direction

does not coincide with that of the eye. Each nerve enters the back of the globe at a distance of about $\frac{1}{3}$th of an in. on the inner side of the antero-posterior axis of the eye.

The eyeball is composed of several investing membranes, and of certain transparent structures, which are inclosed within them, and which, together with the cornea (one of the membranes), act as refractive media of various densities upon the rays of light which enter the eye.

The outermost coat of the eye is the *sclerotic* (from *skleros*, hard). It is a strong, dense, white, fibrous structure, covering about four fifths of the eyeball, and leaving a circular deficiency anteriorly, which is occupied by the cornea. Posteriorly, it is perforated by the optic nerve, and it is there continuous with the sheath which that nerve derives from the dura mater, the fibrous investment of the brain and spinal cord. Near the entrance of the nerve, its thickness is about $\frac{1}{20}$th of an in.; from this it diminishes to about $\frac{1}{40}$th; but in front it again becomes thicker, from the tendinous insertions of the straight muscles which blend with it. This coat, by its great strength and comparatively unyielding structure, maintains the inclosed parts in their proper form, and serves to protect them from external injuries.

The *cornea* (so called from its horny appearance) is a transparent structure, filling up the aperture left in the anterior part of the sclerotic. Its circumference is overlaid by the free edge of the sclerotic, which in some parts presents a groove, so as to retain it more firmly; and the connection by continuity of texture between the two structures is so close, that they cannot be separated in the dead body without considerable maceration.

The cornea, in consequence of its greater convexity, projects beyond the line of the sclerotic; the degree of convexity, however, varies in different persons, and at different periods of life. It is thicker than any part of the sclerotic, and so strong as to be able to resist a force capable of rupturing that tunic.

Although beautifully transparent, and appearing to be homogeneous, it is in reality composed of five layers, clearly distinguishable from one another—viz. (proceeding from the front backwards) 1. The conjunctival layer of epithelium. It is in this epithelium that particles of iron, stone, etc., forcibly driven against the eye, usually lodge, and it is a highly sensitive membrane. 2. The anterior elastic lamina forming the anterior boundary of the cornea proper; it is not more than $\frac{1}{2000}$th of an inch in thickness; and its function seems to be that of maintaining the exact curvature of the front of the cornea. 3. The cornea proper, on which the thickness and strength of the cornea mainly depend. 4. The posterior elastic lamina, which is an extremely thin membrane, in which no structure can be detected. It probably contributes, like the anterior lamina, to the exact maintenance of the curvature of the cornea, so necessary for correct vision. 5. The posterior epithelium of the aqueous humor, which is probably concerned in the secretion of that fluid.

For further details regarding these different layers, we must refer to Todd and Bowman's *Physiological Anatomy*, vol. ii. pp. 17-21.

The *choroid coat* is a dark-colored vascular membrane, which is brought into view on the removal of the sclerotic. Its outer surface, which is nearly black, is loosely connected with the sclerotic by connective tissue, in which are contained certain nerves and vessels—termed the ciliary nerves and vessels—which go to the iris. Its inner surface is soft, villous, and dark-colored. In front, it is attached to the membrane of the vitreous humor by means of the ciliary processes, which consist of about sixty or seventy radiating folds. These are alternately long and short, and each of them is terminated by a small free interior extremity; and they are lodged in corresponding folds in the membrane of the vitreous humor. In other parts, it is loosely connected with the retina. The choroid is composed of minute ramifications of vessels—especially of veins, which, from their whirl-like arrangement, are termed *vasa vorticoso*—of connective tissue, and of pigment cells, which usually approximate to the hexagonal form, and are about $\frac{1}{1000}$th of an inch in diameter. In albinos, this pigment is absent, and hence their eyes have a pink appearance, which is due to the unconcealed blood in the capillaries of the choroid and iris.

The *iris* may be regarded as a process of the choroid, with which it is continuous, although there are differences of structure in the two membranes. It is a thin flat membranous curtain, hanging vertically in the aqueous humor in front of the lens, and perforated by the pupil for the transmission of light. It divides the space between the cornea and the lens into an anterior (the larger) and a posterior (the smaller) chamber, these two chambers freely communicating through the pupil. The outer and larger border is attached all round to the line of junction of the sclerotic and cornea, while the inner edge forms the boundary of the pupil, which is nearly circular, lies a little to the inner side of the center of the iris, and varies in size according to the action of the muscular fibers of the iris, so as to admit more or less light into the interior of the eyeball; its diameter varying, under these circumstances, from about $\frac{1}{3}$d to $\frac{1}{10}$th of an inch. It is muscular in its structure, one set of fibers being arranged circularly round the pupil, and, when necessary, effecting its contraction, while another set lie in a radiating direction from within outwards, and by their action dilate the pupil. These fibers are of the unstriped or involuntary variety. The nerves which are concerned in these movements will be presently noticed.

The varieties of color in the eyes of different individuals, and of different kinds of animals, mainly depend upon the color of the pigment which is deposited in cells in the substance of the iris.

Within the choroid is the *retina*, which, although continuous with the optic nerve—of which it is usually regarded as a cuplike expansion—differs very materially from it in structure. Before noticing the elaborate composition of this part of the eye, which has only been revealed by recent microscopical investigation, we shall briefly mention those points regarding it which can be established by ordinary examination. It is a delicate semi-transparent sheet of nervous matter, lying immediately behind the vitreous humor, and extending from the optic nerve nearly as far as the lens. On examining the concave inner surface of the retina at the back of the eye, we observe, directly in a line with the axis of the globe, a circular yellow spot (*limbus luteus*), of about $\frac{1}{20}$th of an inch in diameter, called, after its discoverer, *the yellow spot of Sömmering*. As there has been much discussion regarding the structure and function of this spot, we may observe that Dr. Todd and Mr. Bowman, two of our most eminent English microscopists, after several examinations, regard it as a small mound or projection of the retina towards the vitreous humor, with a minute aperture in the summit. The only mammals in which it exists are man and the monkey. Its use is unknown, but vision is remarkably perfect at this spot—a circumstance which, however, may possibly be accounted for by the fact, that it is singularly free from blood-vessels, which curve round it, and apparently avoid it.

The structure of the retina, as revealed by the microscope, is in the highest degree remarkable. Although its greatest thickness (at the entrance of the optic nerve) is only about $\frac{1}{120}$th of an inch, and as it extends anteriorly, it soon diminishes to $\frac{1}{250}$ of an inch, the following layers from without inwards may be distinguished in all parts of it: 1. The layer of rods and cones, frequently termed, from its discoverer, the *membrane of Jacob;* 2. The granular layer; 3. The layer of gray nerve substance; 4. The expansion of the optic nerve; and, 5. The limitary membrane. Details regarding the nature of these various layers are given in Kölliker's *Manual of Human Histology*, and in Todd and Bowman, *op. cit.*

It now remains for us to describe the *transparent media* which occupy the interior of the globe, and through which the rays of light must pass before they can reach the retina, and form on it the images of external objects. We shall consider them in the order in which the rays of light strike them.

Immediately behind the transparent cornea is the *aqueous humor* which fills up the anterior and posterior chambers which lie between the cornea and the lens. As its name implies, it is very nearly pure water, with a mere trace of albumen and chloride of sodium. As no epithelium exists in front of the iris, or on the anterior surface of the lens, it is most probably secreted by the cells on the posterior surface of the cornea.

The *crystalline lens* lies opposite to and behind the pupil, almost close to the iris, and its posterior surface is received into a corresponding depression on the forepart of the vitreous humor. In form, it is a double-convex lens, with surfaces of unequal curvature, the posterior being the most convex. It is inclosed in a transparent capsule, of which the part covering the anterior surface is nearly four times thicker than that at the posterior aspect, in consequence, doubtless, of greater strength being required in front, where there is no support, than behind, where the lens is adherent to the vitreous membrane. The microscopic examination of the substance or body of the lens reveals a structure of wonderful beauty. Its whole mass is composed of extremely minute elongated ribbon-like structures, commonly called the *fibers of the lens*, which are regarded by Kölliker as *thin-walled tubes*, with clear, albuminous contents. These fibers are arranged side by side in lamellæ, of which many hundred exist in every lens, and which are so placed as to give to the anterior and posterior surfaces the appearance of a central star, with meridian lines.

The lens gradually increases in density, and, at the same time, in refracting power, towards the center; by this means the convergence of the central rays is increased, and they are brought to the same focus as the rays passing through the more circumferential portions of the lens. (According to Brewster, the refracting power at the surface is 1.3767, and at the center 1.3990.)

According to Berzelius, the lens contains 58 per cent of water, 36 of albumen, with minute quantities of salts, membrane, etc. In consequence of the albumen, it becomes hard and opaque on boiling, as we familiarly see in the case of the eyes of boiled fish. In the adult, its long diameter ranges from $\frac{1}{4}$d to $\frac{2}{3}$ths, and its antero-posterior diameter from $\frac{1}{3}$th to $\frac{1}{4}$th of an inch; and it weighs 3 or 4 grains.

The *vitreous humor* lies in the concavity of the retina, and occupies about four fifths of the eye posteriorly. It is inclosed in the hyaloid membrane, which sends numerous processes inwards, so as to divide the cavity into a series of compartments, and thus to equalize the pressure exerted by the inclosed soft gelatinous mass. Between the anterior border of the retina and the border of the lens, we have a series of radiating folds or plaitings termed the *ciliary processes of the vitreous body*, into which the *ciliary processes of the choroid* dovetail. The vitreous humor contains, according to Berzelius, 98.4 per cent of water, with a trace of albumen and salts, and hence, as might be expected, its refractive index is almost identical with that of water.

The appendages of the eye now claim our notice. The most important of these appendages are the *muscles within the orbit*, the *eyelids*, the *lachrymal apparatus*, and the *conjunctiva*, to which (although less important) we may add the *eyebrows*.

The *muscles* by which the eye is moved are four straight (or *recti*) muscles, and two oblique (the superior and inferior). The former arise from the margin of the optic foramen at the apex of the orbit, and are inserted into the sclerotic near the cornea, above, below, and on either side. The superior oblique arises with the straight muscles; but, after running to the upper edge of the orbit, has its direction changed by a pulley, and proceeds backwards, outwards, and downwards. The inferior oblique arises from the lower part of the orbit, and passes backwards, outwards, and upwards. The action of the straight muscles is sufficiently obvious from their direction: when acting collectively, they fix and retract the eye; and when acting singly, they turn it towards their respective sides. The oblique muscles antagonize the recti, and draw the eye forwards; the superior, acting above, directs the front of the eye downwards and outwards, and the inferior upwards and inwards. By the duly associated action of these muscles, the eye is enabled to move (within definite limits) in every direction.

The *eyelids* are two thin movable folds placed in front of the eye, to shield it from too strong light, and to protect its anterior surface. They are composed of (1) skin; (2) of a thin plate of fibro-cartilage, termed the tarsal cartilage, the inner surface of which is grooved by thirty or forty parallel vertical lines, in which the Meibomian glands are imbedded; and (3) of a layer of mucous membrane, continuous, as we shall presently see, with that which lines the nostrils, and which joins the skin at the margin of the lids, in which the eyelashes (*cilia*) are arranged in two or more rows. The upper lid is much the larger; and to the posterior border of its cartilage a special muscle is attached, termed the *levator palpebræ superioris*, whose object is to elevate the lid, and thus open the eye; while there is another muscle, the *orbicularis palpebrarum*, which surrounds the orbit and eyelids, and by its contraction closes the eye. The Meibomian glands secrete a sebaceous matter, which facilitates the free motion of the lids, and prevents their adhesion. The eyelashes intercept the entrance of foreign particles directed against the eye, and assist in shading that organ from an excess of light.

The *lachrymal apparatus* consists of the lachrymal gland, by which the tears are secreted; two canals, into which the tears are received near the inner angle of the eye; the sac, into which these canals open; and the duct, through which the tears pass from the sac into the nose. The gland is an oblong body, about the size of a small almond, lying in a depression in the upper and outer part of the orbit. The fluid secreted by it reaches the surface of the eye by seven or eight ducts, which open on the conjunctiva at its upper and outer part. The constant motion of the upper eyelid induces a continuous gentle current of tears over the surface, which carry away any foreign particle that may have been deposited on it. The fluid then passes through two small openings, termed the *puncta lacrymalia*, into the canals; whence its further course into the lower portion of the nose is sufficiently obvious. The conjunctiva (or mucous coat) which covers the front of the eyeball, and lines the inner surface of the lids, passes down and lines the canals, sac, and duct; and is thus seen to be continuous with the nasal mucous membrane, of which it may be regarded as an offshoot or digital prolongation. See Mucous Membranes.

We shall conclude this sketch of the anatomy of the human eye by a brief notice of the *nerves* going to this organ and its appendages.

Into each orbit there enters a nerve of *special sense*—viz., the optic nerve, a nerve of *ordinary sensation*—viz., the ophthalmic branch of the fifth nerve, and certain nerves of *motion* going to the muscular tissues, and regulating the movements of the various parts—viz., the third, fourth, and sixth nerves.

As the optic tracts from which the *optic nerves* originate are noticed in the article Brain, we shall merely trace these nerves from their *chiasma* or commissure forwards. This commissure results from the junction of the optic tracts of the two sides; and it is especially remarkable for the fact that it presents a partial decussation of the nervous fibers; the central fibers of each tract passing into the nerve of the *opposite* side, and crossing the corresponding fibers of the other tract, while the outermost fibers, which are much fewer in number than the central ones, pass to the optic nerve of the *same* side. In front of the commissure, the nerves enter the optic foramen at the apex of the orbit, receive a sheath or investment from the *dura mater*, acquire increased firmness, and finally terminate in the retina.

The peculiar mode of termination of the optic nerves in the cup-like expansion of the retina, the impairment or loss of vision which follows any morbid affection of them, and the constant relation in size which is observed in comparative anatomy between them and the organs of vision, afford sufficient evidence that they are the proper conductors of visual impressions to the sensorium.

The first or ophthalmic division of the fifth or trifacial nerve sends branches to the skin of the eyelids and to the conjunctiva. That it is the nerve of ordinary sensation of the eye, is sufficiently obvious from the following facts: (1) That in disease of this nerve in the human subject, it is not uncommon to find the eyeball totally insensible to every kind of stimulus (particles of dust, pungent vapors, etc.); and (2) That if the

nerve be divided in the cranium (in one of the lower animals), similar insensibility results.

The most important of the nerves of motion of the eye is the third nerve, or *motor oculi*. It supplies with motor power the elevator of the upper eyelid, and all the muscles of the globe, except the superior oblique and the external straight muscle, and, in addition to this, it sends filaments to the iris and other muscular fibers within the eye. The application of an irritant (in vivisection experiments) to its trunk induces convulsive contraction of the principal muscles of the ball and of the iris; while division of the trunk occasions an external squint, with palsy of the upper eyelid and fixed dilatation of the pupil. The squint is caused by the action of the external straight and the superior oblique muscles, while the other muscles are paralyzed by the operation. The normal motor action of the nerve upon the iris, in causing contraction of the pupil, is excited through the optic nerve, and affords a good illustration of *reflex action* (q.v.); the stimulus of light falling upon the retina, and, through it, exciting that portion of the brain from which the third nerve takes its origin. This nerve clearly exerts a double influence in relation to vision: (1) it mainly controls the movements of the eye-ball and the upper eyelid; and (2) from its connection with the muscular structures in the interior, it regulates the amount of light that can enter the pupil, and probably takes part in the adjusting power of the eye to various distances.

The fourth nerve supplies the superior oblique muscle with motor power, while the sixth nerve similarly regulates the movements of the external straight muscle—the only two muscles in the orbit which are not supplied by the third pair.

Although not entitled to be termed a nerve of the orbit, the facial nerve deserves mention as sending a motor branch to the *orbicularis* muscle, by which the eye is closed.

2. *Comparative Anatomy of the Eye.*—In *mammals*, the structure of the eye is usually almost identical with that of man. The organ is, however, occasionally modified, so as to meet the peculiar wants of the animal. Thus, in the cetacea, and in the amphibious carnivora that catch their prey in the water, the shape of the lens is nearly spherical, as in fishes, and there is a similar thickening of the posterior part of the sclerotic, so as to thrust the retina sufficiently forward to receive the image formed by such a lens. (See the subsequent remarks on the eyes of fishes.) Again, instead of the dark-brown or black pigment which lines the human choroid, a pigment of a brilliant metallic lustre is secreted in many of the carnivora, forming the so-called *tapetum lucidum* at the bottom of the eyeball, which seems (according to Bowman) to act as a concave reflector, causing the rays of light to traverse the retina a second time, and thus probably increasing the visual power, particularly where only a feeble light is admitted to the eye. The pupil, moreover, varies in form, being transversely oblong in the ruminants and many other herbivora, and vertically oblong in the smaller genera of cats. These shapes are apparently connected with the positions in which the different animals look for their food. Lastly, in some mammals (for example, the horse), there is a rudimentary third eyelid, corresponding to the *membrana nictitans* of birds.

In *birds*, the eye, though presenting the same general composition as in man, differs from the mammalian eye in several important points. From our knowledge of the habits of birds (especially birds of prey), we should naturally expect that from their rapid movements they should be able readily to alter the focus between the extremes of long and short sighted vision, and the modifications we shall now proceed to notice clearly have this object in view.

By examining a longitudinal section of the eye of the owl, we see (1) that the shape of the organ is not spherical, as in mammals, nor flattened anteriorly, as in fishes and aquatic reptiles, but that the cornea is very prominent, and the antero-posterior diameter lengthened; the consequence of this arrangement being to allow room for a large quantity of aqueous humor, and to increase the distance between the lens and the posterior part of the retina, and thus to produce a greater convergence of the rays of light, by which the animal is enabled to discern near objects, and to see with a faint light. In order to retain this elongated form, we find a series of bony plates, forming a broad zone, extending backwards from the margin of the cornea, and lying embedded in the sclerotic. The edges of the pieces forming this bony zone overlap each other, and are slightly movable, and hence, when they are compressed by the action of the muscles of the ball, there is protrusion of the aqueous humor and of the cornea, adapting the eye for near vision; while relaxation of the muscles induces a corresponding recession of the humor and flattening of the cornea, and fits the eye for distant vision. The focal distance is further regulated by a highly vascular organ called the *marsupium*, or *pecten*, which is lodged in the posterior part of the vitreous humor. It is attached to the optic nerve at the point where it expands into the retina, and seems to be endowed with a power of dilatation and contraction; as it enlarges, from distension of its blood-vessels, it causes the vitreous humor to push the lens forwards, while, as it collapses, the lens falls backwards again towards the retina.

In addition to an upper and lower eyelid, birds have an elastic fold of conjunctiva, which, in a state of repose, lies in the inner angle of the eye, but is movable by two distinct muscles, which draw it over the cornea. It is termed the *membrana nictitans;* it is to a certain degree transparent, for (according to Cuvier) birds sometimes look through it, as, for example, the eagle when looking at the sun. The lachrymal gland

is situated as in mammals, but there is here a second gland, the *glandula Harderi*, which yields a lubricating secretion.

There are no very special peculiarities in the eyes of *reptiles*, and we therefore proceed to notice the most remarkable points presented by the eye in *fishes*. From the comparatively great density of the medium (water) through which the rays of light pass before they impinge upon the transparent structure of the eye of the fish, it is obvious that this organ must act as a very powerful refractive apparatus. The main peculiarity in the eye of the fish is the size, extreme density, and spherical shape of the lens, which give it such an extraordinary magnifying power that it has been employed as a simple microscope. See Brewster's *Treatise on the Microscope*, p. 31. But its focus being shortened in proportion as its power is increased, it is necessary that the retina should be brought near its posterior surface. For this purpose, the eyeball is flattened by diminishing the quantity of vitreous humor, which being of nearly the same density as the external water, exerts no perceptible power in bringing the rays of light towards a focus; and this flattened form is maintained by the existence of two cartilaginous plates in the tissue of the sclerotic, which in some of the larger fishes is actually converted into a bony cup. The aqueous humor having here no refractive power, is barely sufficient to allow the free suspension of the iris. The pupil is very large, so as to take in as much light as possible, but is generally motionless. Their eyes being constantly washed by the water in which they live, no lachrymal apparatus is necessary, nor does any exist; and the same remark applies to the *cetacea* amongst the mammals. We thus see that throughout the sub-kingdom of the *vertebrata* the eye is constructed according to one general scheme, with modifications to suit the mode of life of individual classes.

In all the above cases, the structure of the eye is essentially the same; that is to say, we have certain dioptric media for collecting the divergent rays to their proper focus on the retina, and we have the means of adjusting the eye for different distances. But if we examine the eyes of insects, we find that they are constructed on different principles.

In these animals, we have *simple* and *compound* eyes usually associated in the same individual. The simple eyes resemble in many respects the corresponding organs in higher animals, but the compound eyes are extremely elaborate and complex in their structure. They are two in number, appearing as hemispherical masses on the sides of the head. When examined with the microscope, their surface is seen to be divided into an enormous number of hexagonal facets, which are in fact corneæ. In the ant, there are only 50 of these facets in each eye; in the common house-fly, 4,000; in butterflies, upwards of 17,000; and in some of the beetles more than 25,000. Each cornea is found to belong to a distinct eye, provided with a nervous apparatus, and exhibiting a lens, iris, and pupil. Strauss Durckheim, who has carefully studied these structures in the cockchafer, suggests that, the eyes of insects being fixed, nature has made up for their want of mobility by their number, and by turning them in all directions; so that it might be said that these little animals have a distinct eye for every object.

Compound eyes of similar structure occur in many of the crustaceans.

3. Having now described the anatomical structure of the eye in man and certain of the lower animals, we are able to proceed to the consideration of the uses of the various parts of this organ. Assuming a general knowledge of the ordinary laws of geometrical optics (see DIOPTRICS, LENS, etc.), we will trace the course of the rays of light proceeding from any luminous body through the different media on which they impinge. If a luminous object, as, for example, a lighted candle, be placed at about the ordinary distance of distinct vision (about 10 in.) from the front of the eye, some rays fall on the sclerotic, and being reflected, take no part in vision; the more central ones fall upon the cornea, and of these some also are reflected, giving to the surface of the eye its beautiful glistening appearance; while others pass through it, are converged by it, and enter the aqueous humor, which probably exerts no perceptible effect on their direction. Those which fall on and pass through the outer or circumferential part of the cornea are stopped by the iris, and are either reflected or absorbed by it; while those which fall upon its more central part pass through the pupil, and are concerned in vision. In consequence of its refractive power, the rays passing through a comparatively large surface of the cornea are converged so as to pass through the relatively small pupil and impinge upon the lens, which, by the convexity of its surface, and by its greater density towards the center, very much increases the convergence of the rays passing through it. They then traverse the vitreous humor, whose principal use appears to be to afford support to the expanded retina, and are brought to a focus upon that tunic, forming there an exact but inverted image of the object.

This inversion of the image may be easily exhibited in the eye of a white rabbit or other albino animal, after removing the muscles, etc., from the back part of the globe. The flame of a candle held before the cornea may be seen inverted at the back of the eye, increasing in size as the candle is brought near, diminishing as it retires, and always moving in a direction opposite to that of the flame.

The adaptation of the eye to distinct vision at every distance beyond that of a few inches, is extremely remarkable, and numerous attempts have been made to explain the mechanism by which its focal length admits of alteration under the influence of the will. One view that has met with much support is, that the focal length is modified by a slight movement of the lens. In the eye of the bird there is a structure termed the

ciliary muscle, which obviously approximates the lens to the cornea when a short field of view is required, and although the corresponding structure is only slightly developed in man and mammals, it is probably sufficiently strong to produce the slight action required; while for the vision of distinct objects the lens is carried back towards the retina by the elasticity of the connecting tissues. It would appear, however, from the recent researches of Cramer, Helmholtz, Allen Thomson, and others, that the accommodation is effected rather by a change in the *form* than in the *position* of the lens. It has been experimentally proved, that when the eye is turned from a distant to a near object, the antero-posterior diameter of the lens becomes elongated, and the anterior surface becomes more convex, while the opposite changes take place in turning the eye from a near to a distant object. According to Helmholtz, the radius of curvature of the anterior surface of the lens diminishes on turning the eye to a near object from ten to six millimeters (from about 0.4 to 0.24 of an in.), while the most projecting point of the same surface is brought forward about 0.2 of an inch.

Whichever view be adopted, the ciliary muscle takes an active part in the process. According to the observations of Hueck, the focal distance may be changed about three times in a second. The accommodation from a near to a distant object is effected much more rapidly than the converse process.

There are two well-known forms of defective vision in which this power of adaptation is very much limited—viz., short-sightedness or *myopia*, and long-sightedness or *presbyopia*. The limitation, however, is not due to a defect in the muscular apparatus to which we have referred, but to an abnormality either in the curves or in the density of the refracting media. In *short-sightedness* from too great a refractive power from either cause, the rays from objects at the ordinary range of distinct vision are brought too soon to a focus, so as to cross one another, and begin to diverge before they fall on the retina; the eye in this case being able to bring to the proper focus on the retina only those rays which were previously diverging at a large angle from a very near object. The correction for this deficiency is accomplished by interposing between the eye and indistinctly-seen objects a *concave* lens, with a curvature just sufficient to throw the images of external objects at the ordinary distance of distinct vision backwards upon the retina. In *long-sightedness*, on the other hand, there is an abnormal diminution of the refractive power from too flat a cornea, a deficient aqueous humor, or a flattening of the lens, so that the focus is behind the retina. This defect is corrected by *convex* lenses, which increase the convergence of the rays of light. Long-sightedness, as its name *presbyopia* indicates, usually comes on at a comparatively advanced period of life, while short-sightedness is most commonly met with in young persons; but both these rules present occasional exceptions; and the common belief that the latter affection naturally disappears after the middle period of life, is altogether erroneous.

We have already noticed the most essential use of the iris—viz., its power, under the influence of light upon the retina, of modifying the size of the pupil, so as to regulate the amount of light entering the eye. But this is not its only use; one of its offices being to prevent the passage of rays through the circumferential part of the lens, and thus to obviate the indistinctness of vision which would arise from *spherical aberration* (the unequal refraction of the rays passing through the center and near the margin of the lens), in the same manner as the diaphragms employed by the optician. But there are additionally two other means by which this spherical aberration is prevented, which so well illustrate the wondrous mechanism of the eye, that we cannot omit to notice them. They are described by prof. Wharton Jones as follows:

(1.) "The surfaces of the dioptric parts of the eye are not spherical, but those of the cornea and posterior surface of the lens are hyperbolical, and that of the anterior surface of the lens elliptical—configurations found by theory fitted to prevent spherical aberration. This discovery was made at a time when it was not known but that the dioptric parts of the eye had spherical surfaces.

(2.) "The density of the lens diminishing [as we have already shown] from the center to its periphery, the circumferential rays are less refracted than they would have been by a homogeneous lens with similar surfaces. This elegantly simple contrivance has been hitherto inimitable by human art."—*The Actonian Prize Treatise*, 1851, p. 50.

Chromatic aberration, which is caused by the unequal refrangibility of the primitive rays of which white light is composed, when transmitted through an ordinary lens, whereby colored fringes are produced, is *practically* corrected in the eye, although it is doubtful whether it is *entirely* absent. The provision, however, on which the achromatism depends has not been determined with certainty, probably because we do not yet know the relative refractive and dispersive powers of the cornea and humors of the eye. Sir David Brewster denies that the chromatic aberration receives any correction in the eye, and maintains that it is imperceptible only in consequence of its being extremely slight.

4. We have hitherto been considering the eye as an optical instrument which projects pictures of external objects on the retina; we now come to the action of the nervous tunic, the *retina*, and its adaptation to the physical construction of the eye.

When the retina or the optic nerve is stimulated, we have the sensation of light, whatever may be the nature of the stimulus employed—as, for example, if it be a

blow on the eye in the dark, or irritation of the optic nerve from some morbid condition. The sensation of light, then, consists in a recognition by the mind of a certain condition of these nervous structures, and this condition may be induced by the application of any stimulus; the ordinary stimulus obviously being the rays of light which fall upon the retina. There must, however, be a certain amount of light for the purpose of vision. Every one knows that it is difficult and painful to discern objects in a very faint light; and on the other hand, that on suddenly entering a brilliantly lighted room from the dark, everything appears confused for one or two seconds. There is, however, a gradual adaptation of the retina to different amounts of light. Persons long immured in dark dungeons acquire the power of distinctly seeing surrounding objects; while those who suddenly encounter a strong light, are unable to see distinctly until the shock which the retina has experienced has subsided, and the iris has duly contracted. In protecting the retina from the sudden effects of too strong a light, the iris is assisted by the eyelids, the obicular muscle, and, to a certain extent, by the eyebrows. Moreover, the dark pigment of the choroid coat acts as a permanent guard to the retina, and where it is deficient, as in albinos, an ordinary light becomes painful, and the protective appendages, especially the eyelids, are in constant use.

The persistence, during a certain time, of impressions made on the retina, facilitates the exercise of sight. A momentary impression of moderate intensity continues for a fraction of a second; but if the impression be made for a considerable time, it endures for a longer period after the removal of the object. Thus a burning stick, moved rapidly in a circle before the eyes, gives the appearance of a continuous ribbon of light, because the impression made by it at any one point of its course remains on the retina until it again reaches that point. It is owing to this property that the rapid and involuntary act of winking does not intefere with the continuous vision of surrounding objects; and, to give another illustration of its use, if we did not possess it, the act of reading would be a far more difficult performance than it now is, for we should require to keep the eye fixed on each word for a longer period, otherwise the mind would fail fully to perceive it. Again, in consequence of the retention of sensations by the retina, the image of an object may continue to be seen, especially in certain morbid states of the system, and in twilight, for some seconds after the eyes have been turned away from it, and this physiological phenomenon has probably given origin to many stories of ghosts and visions. Thus, if a person has unconsciously fixed his eyes, especially in the dusk, on a dark post or stump of a tree, he may, on looking towards the gray sky, see projected there a gigantic white image of the object, which may readily be mistaken for a supernatural appearance. These ocular spectra are always of the complementary color to that of the object. Thus, the spectrum left by a red spot is green; by a violet spot, yellow; and by a blue spot, orange. However great may be the velocity of a luminous body, it can always be seen; but if an opaque body move with such rapidity as to pass through a space equal to its own diameter in a less time than that of the duration of the retinal impression, it is altogether invisible; and hence it is, for example, that we cannot see bullets, etc., in the rapid part of their flight.

A small portion of the retina, corresponding to the entrance of the optic nerve, is incapable of exciting the sensation of vision when it receives the image of an object. According to Volkmann, this small invisible spot exactly corresponds in size with the artery lying in the center of the optic nerve. If the "blind spot" had been situated in the axis of the eye, a blank space would always have existed in the center of the field of vision, since the axes of the eyes in vision correspond. But as it is, the blind spots do not correspond when the eyes are directed to the same object; and hence the blank which one eye would present is filled up by the other eye. Mariotte, early in the last century, first described the existence of these blind spots. Any one may satisfy himself of their existence by the following simple experiment. Let two small black circles be made upon a piece of paper, about four or five inches apart, then let the left eye be closed, and the right eye be strongly fixed upon the left-hand circle. If the paper be then moved backwards and forwards, a point will be found at which the right-hand circle is no longer visible, although it reappears when the paper is either brought nearer or removed further. Although no other part of the retina possesses the complete insensibility presented by the blind spot, it is probable that its anterior portions have very little to do with vision. When using only one eye, we direct it towards the object we wish to inspect, in such a way as to throw the image to the back of the globe; and when the eye is thus fixed, objects near the boundary of the field of vision are less distinctly seen than those at its center.

The extent of the field of vision for a single eye, the head being fixed, has been calculated by Dr. Young. He found that the eyeball was capable of a movement of 55 degrees in every direction, so that a single eye may have perfect vision of any point within a range of 110 degrees.

We have not yet referred to the longitudinal range, or greatest distance of human vision; indeed, this range varies so extremely that it is difficult to assign an arbitrary limit to it. Many uncivilized races, as the North American Indians, and the inhabitants of the vast Asiatic steppes, possess powers of sight which would appear almost incredible if they had not been thoroughly and frequently corroborated. Our information is more definite regarding the limits of human vision in regard to the minuteness of the

objects of which it can take cognizance. Ehrenberg has carefully studied this subject; and has arrived at the following results. The side of the smallest square magnitude usually visible to the naked eye—either of white particles on a black ground or conversely—is about $\frac{1}{100}$th of an inch; and with the greatest condensation of light and effort on the part of the observer, squares with a side as small as $\frac{1}{300}$th of an inch *may* be recognized, but without sharpness or certainty. Bodies smaller than these, when observed singly, cannot be discerned by the *naked* eye, but may be seen when placed in a row. Much smaller particles may, however, be distinctly seen, if they powerfully reflect light; thus, gold-dust, which in none of its diameters exceeded $\frac{1}{1200}$th of an inch, is easily discernible in common daylight. The delicacy of vision is far greater for lines than for minute areas, since opaque threads of $\frac{1}{2000}$th of an inch may be discerned when held towards the light.

Various topics which the reader might perhaps have expected to find noticed, such, for instance, as "single vision with two eyes," "the appreciation of solid forms by the sense of vision," "correct vision with an inverted image on the retina," etc., which belong fully as much to metaphysics as to physiology, are discussed in the article on VISION. We may also refer those who desire information on these points to prof. Bain's treatise on *The Senses and the Intellect.*

EYE, DISEASE OF THE. The diseases of the eye enumerated by the surgeon are very numerous, partly from the variety of the tissues and parts of which it is formed, partly because the exposed situation and transparency of the eye enable the diseases to be seen. Nearly all its parts are liable to inflammation and its consequences. See OPHTHALMIA. The eyelids are liable to various diseases, as growths of several kinds, most of which the surgeon may remove; inflammation, as blear-eye (ophthalmia tarsi); to be misdirected inwards or outwards, *entropium* and *ectropion* (q.v.); and the upper eyelid may fall down (ptosis) from palsy of the common motor oculi nerve. The eyelashes may grow in upon the eye (trichiasis), and produce serious results. When plucked out, they grow again; and if they still grow in upon the eye after this palliative treatment has been tried several times, the surgeon has to cut down on their roots, and destroy them. The duct which conveys away the tears to the nose is liable to inflammation and obstruction, causing watery eye. See LACHRYMAL ORGANS. The cornea is liable to opacity in various degrees. The mere *nebula* or cloudy condition, either limited or general, may pass off, and leave the cornea again clear; but the white mark, which is the cicatrix or scar of an ulcer, is permanent, although it may become smaller by the disappearance of the surrounding haze. The pupil may be closed as the result of iritis, or of operations for cataract, and an artificial pupil may be made by either of the three methods—incision, excision, or separation—but the operation is seldom attended with success. For opacities of the crystalline lens, see CATARACT. For an account of diseases of the nervous parts of the eye, see AMAUROSIS. Various affections of vision may arise from peculiar or altered conditions of the refracting humors of the eye—as near-sightedness (myopia), far-sightedness (presbyopia), the appearance of bodies (muscæ) floating in or before the eye; and there may be double vision (diplopia), with two eyes or with one. See VISION. The parts between the eye and its bony orbit may be the seat of inflammation, abscess, or tumor, making the eye protrude. The movements of the eyeballs may be affected from palsy of the motor nerves, or from contraction of the lateral recti muscles, causing inward or outward squinting. See SQUINTING. The eye may lose all feeling, from palsy of the fifth pair of nerves. The whole of the same side of the face, nostril, and mouth, will be in the same condition, and the eye becomes inflamed and disorganized. Substances thrown against the eye may injure it. Quicklime is rapidly destructive to the eye, slaked lime and mortar less so. When one of these, or any other caustic, has got into the eye, sweet oil is the best thing to introduce, until the surgeon arrives to remove them. If it is oil of vitriol (sulphuric acid) that has been the cause of the injury, a weak solution of soda may be used in the first place to neutralize the acid. In gunpowder explosions near the eye, besides the burn, the particles are driven into the surface of it, and will cause permanent black stains over the white of the eye, unless they are carefully removed at the time. When chips of glass, stone, etc., are driven into the interior of the eye, there is little hope of it being saved from destructive inflammation. When only partially sunk into the cornea, as is often the case with sparks of hot iron, or "fires," as they are called, the rubbing of the projecting part on the eyelid causes great pain, and the surgeon has not much difficulty in removing them. Most commonly these, or other "foreign bodies," as particles of dust, sand, seeds, flies, etc., merely get into the space between the eyeball and the lids, almost always concealed under the upper, as it is the larger, and sweeps the eye. They cause great pain, from the firmness and sensitiveness of the papillary surface of the lid, soon excite inflammation, and their presence, as the cause, is apt to be overlooked. The lid must be turned round to find them. To do this, pull the front or edge of the lid forwards by the eyelashes, held with the finger and thumb, and at the same time press down the back part of the lid with a small pencil or key. The lid will readily turn round, when the body may be seen about its middle, and may be removed with the corner of a handkerchief. Another plan, which the person himself may try, is to pull forward the upper lid by the eyelashes, and push the lashes of the lower lid up behind

it, when the foreign body may be brushed out. After the bodies are removed, a feeling as if they were still there may remain for some time.

EYEBRIGHT, *Euphrasis,* a genus of plants of the natural order *scrophulariaceæ,* having a tubular calyx, the upper lip of the corolla divided, the lower of three nearly equal lobes, the cells of the anthers spurred at the base, a two-celled capsule and striated seeds. Some of the species are root-parasites. The only British species is the COMMON E. (*E. officinalis*), a little plant of at most 6 or 8 in. in height, with ovate serrated leaves, and white or reddish flowers streaked with purple, appearing singly in the axils of the leaves. It is very abundant in many pastures, and even on high mountains, where—as in very northern regions—it is often to be seen of only an inch in height, gemming the ground abundantly with its bright little flowers. It is a very widely distributed plant, a native of most parts of Europe, the n. of Asia, the Himalaya, etc. It was once in great repute as a cure for ophthalmia, and is still much used in rustic practice for diseases of the eye. A spot on the corolla, something like a pupil, gave it much of its reputation, whilst the fanciful doctrine of *signatures* prevailed in medicine; but it has been found really efficacious in catarrhal inflammations of the eye, and in other catarrhal affections. It is a weak astringent. It is the *euphrasy* of Milton, with which he represents the archangel Michael as *purging the visual nerve* of Adam.

EYE-PIECE, the name given to the microscope by means of which the image of the object formed in the focus of a telescope is observed. See TELESCOPE.

EYE-STONE (see OPERCULUM). This article was formerly much used, and is still to some extent, to remove foreign substances from the eye. It is put under the lid, is moved around by the motion of the eye, and dust or cinders adhere to it and are taken out with it.

EYLAU, usually called Prussian Eylau, a t. in the government of Königsberg, and 22 m. s. of the town of that name, contains about 3,000 inhabitants, and is celebrated for the battle fought there between Napoleon and the allies—Russians and Prussians—under Bennigsen, Feb., 8, 1807. The French force amounted to about 80,000, and the allies numbered 58,000, but were superior in artillery. The battle was opened soon after daylight by a furious attack made by the French left on the Russian right and center, which, however, proved utterly unsuccessful, the attacking corps being all but completely destroyed. The murderous struggle was repeatedly renewed, and the promise of victory alternated now to the one side and now to the other. Night closed upon the whole allied line pressing onward and driving the French before them. Nevertheless, the victory is generally claimed by the latter, chiefly because the allied forces, unable to recruit their strength, were ordered to retreat from the field on the night of the battle, and to retire upon Königsberg. The loss of the allies is estimated at about 20,000, while that of the French must have been considerably greater.

EYRE, CHARLES, b. England, 1817; a Roman Catholic priest in Newcastle, canon of the diocese of Hexham and Newcastle; vicar-general; archbishop for the w. district, and in 1868, apostolic delegate for Scotland. He is now archbishop of Glasgow. He is the author of a *History of St. Cuthbert.*

EYRE, EDWARD JOHN, a distinguished explorer and colonial governor, is the son of an English clergyman in Yorkshire, and was b. in 1817. Emigrating to Australia at the age of seventeen, he was prosperous as a squatter, and soon became a magistrate. In 1840, he failed in an attempt to explore the region between south and western Australia—a task he accomplished, in spite of enormous difficulties, in 1841. In 1846, he became lieut.gov. of New Zealand, and in 1852, of St. Vincent. In 1862, he was appointed governor of Jamaica, where in 1865 negro disturbances broke out. E., resolving on prompt measures, proclaimed martial law; a Mr. Gordon, believed to have had a leading part in the rising, was hurriedly tried by court-martial, and hanged two days after, the sentence having been confirmed by Eyre. A commission sent to inquire into this case, found that Gordon had been condemned on insufficient evidence, and E. was recalled. On his return he was prosecuted for murder by a committee of whom J. Stuart Mill was the most prominent; Mr. Carlyle and sir R. Murchison promoted the E. defense fund. The charge of murder was dismissed by the magistrates of Market-Drayton in 1867. Since then E. has lived in retirement.

EZE'KIEL (meaning "God will strengthen," or "strength of God"), one of the Hebrew prophets, was the son of the priest Buzi, and along with Jehoiachin, king of Judah, was carried captive, when still a young man, to Mesopotamia, by order of Nebuchadnezzar, about 598 B.C. He was a member of the Jewish community which settled on the banks of the river Chebar, and first appeared as a prophet about the year 594 B.C. His prophetic career extended over a period of 22 years. The date of his death is not recorded.—The book of Ezekiel consists of three parts: the *first* (chaps. i.–xxiv.), composed before the final conquest of Jerusalem by Nebuchadnezzar, announces the complete overthrow of the kingdom of Judah, on account of its increasing unfaithfulness to God; the *second* (chaps. xxv.–xxxii.) threatens the surrounding nations, which were exulting maliciously over the ruin of Judah, with divine punishment; and the *third* (chaps. xxxiii.–xlviii.) prophesies the future deliverance of the Hebrew nation, and the rebuilding of Jerusalem. This last portion is generally believed to contain several Messianic predic-

tions, three of which are considered specially remarkable (chaps. xxxvi.–xxxvii., xxxviii.–xxxix., and xl.–xlviii.); and it is beyond all question that only under a world-wide dispensation like the Christian, can the glorious visions of the prophet receive a historical realization. The book is full of magnificent but artificial symbolism, and of allegories difficult to understand; whence Jerome calls it "a labyrinth of the mysteries of God;" but here and there, as in chapters 1st and 2d, it contains visions that indicate the possession on the part of E. of a most vivid and sublime imagination. E.'s authorship of the book has been questioned. The Talmud says, it was written by the great synagogue, of which E. was not a member; and Ewald, believing that traces of later elaboration are quite obvious, suggests that the collection and combination of the various prophecies into a book may not have been the prophet's own doing. The opinion of most critics, however, is, that a prophet who was so much of a literary artist as E., was more likely to have completed the book himself than to have left such a work to others. The text is far from being in a perfect condition. It is partly corrupted by glosses, has partly been retouched by later hands, and may often be amended by the Septuagint version. The best commentaries on the book of Ezekiel are those of Hävernick (Erlangen, 1843) and Hitzig (Leip. 1847).

EZEKIEL, BOOK OF (Ezekiel, *ante*), consists of an *introduction* (chapters i.–iii.) reciting the glorious vision in the midst of which Ezekiel received his call to the prophetic office, his commission to Israel, and his encouragements from God; and *three principal parts*.

I. Prophecies against the people of Israel (chapters iv.–xxiv.), subdivided into 18 sections. 1. The siege of Jerusalem, represented by a picture drawn on a tablet; the prolonged transgressions of the people, by the prophet's continued reclining on his side; and the hardships they should suffer, by the eating of coarse and loathsome bread. 2. Judgments on the city by famine, war, and dispersion abroad, signified by hair and beard cut off, weighed, scattered, and burned. 3. Judgments against idolatry, with a promise that a remnant should be saved. 4. Captivity, inevitable and severe, under the emblem of a chain. 5. Transgressions of Judah, represented by the image of jealousy; and consequent judgments, typified by the scattering of fire, and the departure of the shekinah. 6. The captivity of Zedekiah, represented by the removal of household goods, and bread eaten with trembling. 7. False prophets reproved and threatened. 8. Idolatrous elders condemned. 9. The rejection of Jerusalem, represented by the burning of an unfruitful vine. 10. God's compassionate love, against which Israel had sinned, compared to kind care shown to a child cast out at its birth. 11. Judgments on Israel for turning to Egypt for help against Babylon, denounced under the emblem of two great eagles, one representing Nebuchadnezzar, and the other Pharaoh. 12. Judgment denounced on every transgressor for his own sins, contrary to the common proverb implying that children suffer for their fathers' faults. 13. Captivity of the Jewish kings, represented by lions pursued and captured, and of the Jewish people, by a vine scorched, torn up, and planted in the wilderness. 14. God's mercies to Israel, and their continued transgressions reviewed; and, while final forgiveness is promised to the penitent, impending judgments are declared. 15. A consumed forest represents Jerusalem destroyed, and a sharp sword, Nebuchadnezzar cutting down Ammonites and Jews. 16. Recital of sins committed in Jerusalem by all classes of the people, and judgments on them denounced. 17. Idolatries of Samaria and Jerusalem, and their punishment. 18. Dreadful destruction of Jerusalem again proclaimed.

II. Prophecies against various nations around Judea (chapters xxv.–xxxii.), subdivided into three sections. 1. Against the Ammonites, Moabites, Edomites, and Philistines. 2. Against Tyre (represented, in its beauty, wealth, and renown, as the anointed cherub on the mountain of God) with a promise of returning prosperity to Israel. 3. The destruction of Egypt foretold and illustrated by a recital of Assyria's glory and fall under the emblem of a cedar of Lebanon cut down.

III. Promises of future deliverance to Israel (chapters xxxiii.–xlviii.) subdivided into 6 sections. 1. The prophet is compared to a watchman appointed to give warning of danger, and is exhorted to be faithful. While under the power of the prophetic spirit, being informed that Jerusalem had been taken by Nebuchadnezzar, he foretells the desolation of the land, and reproves the hypocrisy of the captives around him. 2. The rulers, civil and ecclesiastical, condemned as unfaithful shepherds, and a general restoration of the people promised under the guidance of the good shepherd, David the prince. 3. Judgments against Edom again foretold. 4. Promises of restoration renewed to Israel, under the emblems of fruitful mountains, sprinkled water, a new heart, dry bones raised to life, and two sticks united together. 5. Destruction of Gog and Magog, followed by blessings to Israel. 6. Vision of the temple, the returning glory of the Lord, the division of the land, the healing waters from the sanctuary, the portions of the tribes, the city with 12 gates whose name shall be, "The Lord is there."

EZION-GABER, or Ezion-Geber, the last station of the Israelites before coming to "the wilderness of Zin, which is Kadesh." It was subsequently the station of Solomon's navy; that at which Jehoshaphat's ships were broken. This port, of which no trace remains, is supposed to have been at the modern Ain-el Ghudyan, about 10 m. up the dry bed of the Arabah, and near Elath, or Berenice.

EZ'RA, a Jewish lawgiver of the 5th c. before Christ. He was descended from a distinguished priestly family, and was resident in Babylon in the reign of Artaxerxes Longimanus. With this monarch he seems to have been in considerable favor, and in the year 478 B.C. obtained permission to return to Jerusalem with a band of his countrymen amounting to 1754. His services to the new colony in regard to their civil and religious condition were very important. He endeavored to reimpose more strictly the law of Moses forbidding marriages with heathen women, and disannulling such ties where they had been formed. He also introduced into Jewish literature the square Chaldee character, instead of the old Hebrew or Samaritan one, which had been customary till then; but the tradition that he rewrote from memory the sacred books burned at the destruction of the temple, deserves no regard; and it is likewise a mere tradition that as president of the socalled great synagogue (an assemblage of Jewish scholars) he arranged and completed the canon of the Old Testament. See BIBLE.—The book called by his name, along with the book of Nehemiah, formed, among the Jews, the first and second books of Ezra. It records events which extended over a period of nearly 80 years, and divides itself naturally into two parts. The first six chapters embrace a period of 21 years, and relate the history of the first return from the Babylonish captivity; the rest of the book chronicles the *second* return under Ezra the priest, in the reign of Artaxerxes Longimanus. The book is partly written in Chaldee, and is probably the work of various authors.

EZRA, BOOK OF (EZRA, *ante*), records portions of Jewish history after the captivity. It is divided into two parts, the first of which, comprising six chapters, contains: 1. The decree of Cyrus giving permission to the Jews to return to their own land and rebuild their temple. 2. The record of his restoration of the sacred vessels of silver and gold (numbering in all 5,400) which Nebuchadnezzar had taken from the temple and brought to Babylon. 3. The return of a portion of the people and their commencement of the work. 4. The obstacles placed in their way by men who had taken possession of the land, and, consequently, did not wish the Jews to be re-established in it. 5. When this opposition had continued more than 20 years, Darius Hystaspis, having found the decree of Cyrus, confirmed it and gave the Jews additional privileges and help by which they were enabled to complete their temple and re-establish divine worship. After an interval of nearly 60 years, the second part, comprising four chapters, contains: 1. The decree of Artaxerxes giving Ezra authority to proceed to Jerusalem, with all Jews who wished to accompany him, and re-establish the Jewish state. On this occasion, the king, with his counselors, added large sums of silver and gold to the free-will offerings of the people, and also directed his treasurers in the provinces intervening between Babylon and Jerusalem to furnish the expedition liberally with needed supplies. 2. The arrival of Ezra accompanied by about 1500 chief men and 200 priests and Levites. 3. The reconstruction of the religious and social state of the Jews in accordance with the law of Moses. This reformation included the very difficult work of annulling the marriages which many had made with heathen families of the land. The Jews have always maintained the canonical authority of this book, giving it an equal place with the Pentatauch, and comparing Ezra with Moses. Ezra is justly regarded as the author of the whole book, although in the first part, relating to the actions of others, he drew his materials from various sources; in the second part only he describes events in which he was an eye-witness, a prominent actor, and the chief director.

F

F, THE sixth letter in the Latin and English alphabets, corresponding to the *vau* of the Hebrew, and the *digamma* (q.v.) of the old Greek alphabet. See ALPHABET. *F* and *v* are called *labio-dentals*, from the organs employed in producing them; they belong to the class of consonants called aspirates (q.v.), and bear the same relation to each other that exists between the unaspirated labials *p* and *b*. In Latin, *f* had a peculiar sound, different from that of Greek *φ*, as we learn from Cicero and other Latin writers. What the sound was, we do not exactly know, but it approached to the nature of a strongly breathed *h*, as is indicated by the fact, that in the Sabine dialect it sometimes takes the place of *h*, as Sab. *fircus* = Lat. *hircus* (a he-goat); and the Latins made use both of *faba* and *haba* for "a bean." This affinity is also shown in modern Spanish, where *h* takes the place of the Latin *f;* as Lat. *femina*, Sp. *hembra; fl* becomes, in Spanish, *ll*, as Lat. *flamma* = Sp. *llama*. F, in English and other Teutonic tongues, corresponds to *p* in Greek and Latin; as Lat. and Gr. *pater* = Eng. *father;* Gr. *pod-*, Lat. *ped-* = Eng. *foot;* Lat. *pisc-* = Eng. *fish;* Gr. *pur* = Eng. *fire;* Lat. *vulp-* = Eng. *wolf*. In some words, *v* takes the place in German of *f* in English; as Ger. *vater* = Eng. *father;* Ger. *vier* = Eng. *four*. In the Aberdeenshire dialect, *f* takes the place of *wh*, as *fat* for *what; fup* for *whip*. This seems to be a relic of the Teutonic pronunciation of *w* (= *v*), still to be observed in the Cockney pronunciation of *vill* for *will, ven* for *when;* but why the sharpening of the labial into *f* should be confined to one circumscribed district of Scotland, and to the case of *w* followed by *h*, it is hard to say.

F in Lat. and Greek becomes *b* in Eng.; as Gr. and Lat. *fer-* = Eng. *bear;* Lat. *frater* = Eng. *brother.* See Letter B.

More remarkable are the interchanges between *f* and the series *d, th, t.* Lat. *foris* = Gr. *thura,* Eng. *door;* Lat. *fera* = Gr. *ther,* Eng. *deer;* Eng. *red,* Sans. *ruthira,* Gr. *eruthros,* Lat. *rutilus, rufus, ruber.* In Russian, *Fiodor, Afanasja* = *Theodor, Athanasia.* In words originally common to both Greek and Latin, the Greek φ is represented in Lat. by *f;* as Gr. φημη = Lat. *fama.* But in spelling Greek words with Latin letters, the Romans, after the time of Cicero, were careful to represent φ, not by *f,* which had a somewhat different power, but by *ph.* This mode of spelling words derived from Greek is still adhered to in English, German, and French, although the distinction in sound has long been lost sight of. The distinction began to disappear in the Latin itself in the time of the later Roman emperors, when inscriptions show such spelling as *Afrodite* for *Aphrodite;* and this simplification is followed in modern Italian, Spanish, and Portuguese. *Ph* is sometimes erroneously used in words having no connection with Greek; as Adolphus, for the Teutonic Adolf or Adalolf—i.e., "noble wolf."

F, in music, is the fourth note of the natural diatonic scale of C, and stands in proportion to C as 4 to 3, and is a perfect fourth above C as fundamental note. F major, as a key, has one flat at its signature—viz,, B flat. F minor has four flats the same as A flat major, of which it is the relative minor.

FAAM, or FAHAM (*angræcum fragrans*), an orchid, native of India and the Mascarene isles, much prized in the east for the delightful fragrance of its leaves, which is owing to the presence of *coumarin* (q. v.), and resembles that of the tonka bean and of vernal grass. In the isle of Bourbon, an infusion of F. leaves is in great repute as a cure for pulmonary consumption and as a stomachic. In France, it has been successfully employed, under the name of *isle of Bourbon tea,* as an expectorant, anti-spasmodic, and stomachic.

FABA, a genus of plants to which belongs *faba vulgaris,* or *vicia faba,* the common bean of Europe. The beans generally cultivated in America are of the genus *phaseolus.*

FABACEÆ. See LEGUMINOSÆ.

FA'BER is the name of two artists, father and son. John F., the elder, was b. in Holland, where he acquired a knowledge of the art of mezzotint-engraving. Subsequently, he came to England, and died at Bristol, May, 1721. His works do not exhibit much talent.—The younger F., also called John, obtained, however, a high reputation as an engraver in mezzotint. His principal works are the portraits of the Kit-cat club, and the beauties of Hampton court, several of which are executed with great freedom, vigor, and beauty. F. lived in London, where he is believed to have died in 1756.

FABER, CECILIA BÖHL VON, 1797–1877; a celebrated novelist of Spain, better known by her masculine pseudonym of FERNAN CABALLERO. She was educated in Spain and Germany, and became an accomplished linguist. In 1813, she returned to Cadiz, and the next year married capt. Planells, whom she accompanied to America, where she passed a number of years of her married life. Not long after the death of her first husband she was married to the marquis de Arco Hermoso, and was a frequent attendant at the Spanish court, where her beauty, vivacity, and wit were much admired. Her second husband died in 1835, and in 1837 she married señor de Arrom, a member of the bar. The union was unfortunate, and it is to the trials and disappointments of her later life that the world is indebted for her literary works. Washington Irving visited her, and encouraged her to pursue Spanish literature, but it was many years later before *The Family of Alvareda,* her first work, was given to the public, nor was it until after her 50th year that she appeared as an author at all, and then under an assumed name. Her works soon became popular, and were translated into French and German, so that within ten years she gained a European reputation. A collected edition in 13 vols. was issued from the Madrid press in 1859, and about the same time she was appointed governess of the royal children. Among the many schemes of her busy life was one for the prevention of cruelty to animals.

FABER, FREDERICK WILLIAM, D.D., 1814–63; b. England; educated at Oxford. He gave up his Calvinist views and became an enthusiastic admirer and follower of John Henry Newman. In 1841, he traveled on the continent, and recorded his observations in *Sights and Thoughts in Foreign Churches and among Foreign Peoples.* In 1845, he was converted to the Roman Catholic faith, and founded a religious community at Birmingham, called Wilfridians, after the name Wilfrid, which he had assumed. This community was ultimately merged in the oratory of St. Philip Neri, of which Newman was the head; and in 1849 a branch was established in London over which Faber presided till his death. He published a number of theological works, and edited the *Oratorian Lives of the Saints,* but it is mainly as a writer of fervent and deeply tender devotional hymns that he is known.

FABER, Rev. GEORGE STANLEY, a learned and voluminous divine of the Anglican church, was the eldest son of the Rev. Thomas Faber, and was b. 25th Oct., 1773. He entered university college, Oxford, in 1789, where he achieved a brilliant academical reputation. Before his 21st year, he was elected fellow and tutor of Lincoln college.

In 1796, he took his degree of M.A.; was Brampton lecturer for 1801, in which capacity he delivered the lectures subsequently published under the title of *Horæ Mosaicæ;* and in 1805 became vicar of Stockton-on-Tees, in the country of Durham. After several changes, he received from bishop Van Mildert, in 1832, the mastership of Sherburn hospital, near the city of Durham, where he died 27th Jan., 1854. F. wrote upwards of forty works, several of which, especially those upon prophecy, have enjoyed a very extensive popularity. All his writings are marked by "strong masculine sense, extensive classical erudition, and a hearty love of hypothesis." The principal are—*The Genius and Object of the Patriarchal, the Levitical, and the Christian Dispensations* (1823, 2 vols.); *The Difficulties of Infidelity* (1824); *The Sacred Calendar of Prophecy* (1828, 3 vols.); *The Primitive Doctrine of Election* (1836), reckoned by some critics the most valuable of all F.'s writings; *The Primitive Doctrine of Justification* (1837); and *Eight Dissertations upon the Prophetical Promises of a Mighty Deliverer* (1845, 2 vols.).

FABER, or LEFÈVRE, JACOBUS, 1450–1536; surnamed STAPULENSIS; b. Picardy; a pioneer of the Protestant movement in France. He was a graduate of the university of Paris, and professor in the college of cardinal Lemoine. Though his works were very obnoxious to the Roman church he was safe from persecution under the king's protection until the king was taken prisoner at the battle of Pavia. He was then formally condemned, and his works were suppressed; but on the return of Francis all such proceedings were stopped. Among his works were the *Physics, Metaphysics, and Ethics of Aristotle;* and *A Psalter* in five languages. In 1512, he issued a translation into French of the Epistles of St. Paul, and of the whole New Testament in 1523, of the Pentateuch in 1528, and in 1530 of the whole Bible. His work has been the basis of all subsequent French versions. He also published notes and comments constantly exalting the Bible above the church as the rule for human conduct. When the princess Margaret became queen of Navarre, she gave Faber an asylum beyond the reach of his persecutors, where he passed his old age in quiet.

FABIAN GENS. See FABIUS, *ante.*

FA'BIUS, the name of one of the oldest and most illustrious patrician families of Rome. Three brothers of this name alternately held the office of consul for seven years (485–479 B.C.). In 479, the Fabii, under K. Fabius Vibulanus, migrated to the banks of the Cremera, a small stream that flows into the Tiber a few miles above Rome. Here, two years after, they were decoyed into an ambuscade by the Veientes, with whom they had been at war, and, with the exception of one member, who had remained at Rome, and through whom the race was perpetuated, the entire *gens,* consisting of 306 men, were put to the sword. The most eminent of the Fabii were Quintus Fabius Rullianus —supposed to have been the first who obtained for himself and his family the surname of *Maximus*—and his descendant, Quintus Fabius Maximus Verrucosus, named Cunctator, the delayer. The former was the most eminent of the Roman generals in the second Samnite war, and was twice dictator, and six times consul. The later, who, in the course of his career, was five times consul, and twice censor, was elected dictator immediately after the defeat of the Romans at Trasimenus. The peculiar line of tactics which he observed in the second Punic war obtained for him the surname by which he is best known in history. Hanging on the heights like a thundercloud, to which Hannibal himself compared him, and avoiding a direct engagement, he tantalized the enemy with his caution, harassed them by marches and countermarches, and cut off their stragglers and foragers, while at the same time his delay allowed Rome to assemble her forces in greater strength. This policy—which has become proverbial as "Fabian policy"—although the wisest in the circumstances, was neither appreciated in the camp nor at home; and shortly after, Marcus Minucius Rufus, master of the horse, was raised to an equal share in the dictatorship, a position, however, which he occupied but for a short time. During his fifth consulship, Fabius recovered Tarentum, which had long been one of Hannibal's important positions. He died in 203 B.C. C. Fabius, surnamed Pictor, executed upon the walls of the temple of Salus —dedicated by the dictator C. Junius Brutus Bubulus in 302—the earliest Roman paintings of which we have any record; and his grandson, Q. Fabius Pictor, was the first writer of a Roman history in prose.

FA'BLE (Lat. *fabula*) is a word of twofold signification. First, it is employed by some writers in a general sense to denote any fictitious narrative, as, for example, the incidents in an epic or dramatic poem. At one time also, when the myths of the Greeks and Romans were thought to be satisfactorily accounted for by regarding them as conscious inventions of the ancient poets and priests, it was customary to speak of them as *fables,* but this application of the term is now abandoned by scholars. See MYTH. According to the second and more frequent signification of the word, it denotes a special kind of literary composition, either prose or verse, in which a story of some kind is made the vehicle for conveying a universal truth. It differs from a parable in this respect, that while the latter never transcends in conception the bounds of the probable or the possible, the former always and of necessity does. The story of the "Good Samaritan" imagined by the Savior, is a parable; if it was not true, it might have been, for it contains nothing either improbable or impossible; but when Jotham went up to the top of Mt. Gerizim, and spoke to the men of Shechem about the trees going

forth to anoint a king over them, he made use of the F. proper. The peculiarity, therefore, of the *structure* of the F. consists in the transference to inanimate objects, or, more frequently, to the lower animals, of the qualities of rational beings. By the very novelty and utter impossibility of the representation, the interest of the hearer or reader is excited, and thus its symbolic meaning and moral became transparent to him, at least if the F. is well contrived. The ancient fabulists were simple, clear, and earnest in their representations. They seem to have sprung up in the east. Among the more celebrated are Bidpai (q.v.), or Pilpai, and the Arabian Lokman, who is said to have lived in the time of king David. Among the Greeks, the greatest name is that of Æsop (q.v.), whose fables, at a much later period—the precise time is not exactly known—were versified by a certain Babrius (q.v.). Among the Romans, Phædrus cleverly imitated Æsop, but with considerable modifications, thus giving a certain amount of independent value to his work. It is perhaps worth mentioning here, that the well-known F. of the *Town Mouse and Country Mouse*, told by Horace, is of purely Roman origin, and is probably the only one in existence of which that can be affirmed. Leaving the classical period, and before entering on the dark ages, we encounter the name of Aphthonius, who flourished in the early part of the 4th c., and who wrote indifferent fables in Greek prose; and still later, the name of Flavius Avianus, who composed forty-two, no better, in Latin elegiacs. During the dark ages, the F. in various forms appears to have been cultivated in the monasteries, although nothing meritorous has survived; but in the middle ages, it acquired fresh life and vigor. An edition of the fables current in Germany in the time of the Minnesingers has been published by Bodmer. The oldest known German fabulist is Stricker, who lived about the middle of the 13th c.; but the famous mediæval F. of *Reineke Fuchs*, or the History of Reynard the Fox (q.v.), stretches in some of its numerous primitive forms much further back. In later times, most nations have cultivated the F. with more or less success. We may mention among the English, Gay; among the Germans, Hagedorn and Gellert, and Lessing; among the Italians, Pignotti; among the Russians, Krylov; and above all, among the French, La Fontaine, whose fables are remarkable for their arch and lively humor, their delicate sarcasm, their sagacity, and felicity of expression. Now, however, the F. has gone entirely out of fashion.

FABLIAU, plur. FABLIAUX (from the Latin *fabulari, fabellare*, to speak or to tell), was the name given in the old French literature to a class of short metrical narratives, intended merely for recitation, and which had for their subject-matter the talk and news of the day in the middle ages. The narrator of such news was called a *fableor* (plur. *fablière*), in opposition to the *chanteor*, or singer proper, who composed poems not only for recitation, but also for singing. Besides the fabliaux, the department of the fableor embraced the *Romans d'aventure* (in short unstrophied couplets), usually called *contes*, whence their author or reciter also bore the name of *conteur;* and the *dits*, or sayings, the special cultivator of which was termed a *diseur*. As the fabliaux were fundamentally distinguished from the more genuine forms of poetry by the every-day character of their subject-matter, so the mode of treatment which their authors adopted was also more anecdotical, epigrammatic, and witty—the wit being richly spiced with scandal. They appear to have maintained a sort of ironical and parodistic antagonism to the idealism of the epics of chivalry. In these fabliaux, the essential character of the French people manifested itself, and that opposition of the real to the ideal, of the understanding to the imagination, which, after the time of Francis I., began to characterize French literature generally. Thus they lashed not only the priesthood and the nobility in their actual degeneracy, but, from the very character of their satire, they engendered a contempt for the religious-chivalric spirit itself, and for all ecclesiastical and knightly notions and ceremonies. The oldest fabliaux are not of French origin; they are a fruit of the crusades, and were brought to France from the east, but they received a national coloring, and soon took root in the west. From them sprung the drama of France. One of the most fecund fablière was Rutebeuf, who flourished in the reigns of Louis IX. and Philippe III., whose works were published by Jubinal (2 vols., Paris, 1837). He was a true Parisian, and the prototype of Villon, La Fontaine, and Voltaire. The best collections of fabliaux and contes are those of Barbazan (3 vols., Paris, 1756), of Méon (2 vols., Paris, 1823), and of Jubinal (2 vols., Paris, 1839–43).

FABRE, FRANÇOIS XAVIER PASCAL, 1766–1837; b. France; a painter, pupil of David. One of Fabre's earliest productions, "Execution of the Children of Zedekiah by order of Nebuchadnezzer," secured for him the great prize of the academy. It was supposed that he was privately married to the duchess of Albany, who at her death made him her sole heir.

FABRETTI, RAFFAELE, a distinguished antiquary and archæologist, was b. at Urbino 1618, and was attracted at an early period to antiquarian studies by the great classical remains of Rome. Under pope Alexander VII. he became papal treasurer, and subsequently was appointed chancellor to the papal embassy at Madrid. A residence of 13 years in Spain enabled him to explore all the antiquities of the kingdom, and to carry his studies to a point which rendered indispensable his return to Rome, the great parent fount of ancient learning. He was there made judge; and under Innocent XII., became keeper of the papal archives of the castle of St. Angelo, a post which afforded

the widest scope to his favorite pursuits. About this time he wrote his two important works: *De Aquis et Aquaductibus Veteris Romæ* (4 vols., 1680, reprinted with notes and additions in 1788), and *Syntagma de Columnâ Trajani* (Rome, 1683). His treatise entitled *Inscriptionum Antiquarum Explicatio* (1699) throws invaluable light on the discoveries made by himself in the catacombs; and his erudite investigations concerning the reliefs known as the Iliac tables, and the grand subterranean canals of the emperor Claudius, are equally full of interest to science. His rare collection of inscriptions, etc., is deposited in the ducal palace of Urbino. F. died in 1700.

FABRIA'NO, a city of Italy, in the province of Ancona (formerly part of the papal states), is situated at the eastern base of the Apennine range, 28 m. w. of Macerata. It has a cathedral, and several convents, but is chiefly worthy of mention on account of its great paper manufactures, which were established in 1564. The churches and private houses contain many specimens of the school of painting which flourished here. Pop. '71, 7,612.

FABRIA'NO, GENTILE DA, an Italian painter, who flourished in the early part of the 15th century. He was born—it is not exactly known when—at Fabriano, and received his first instructions from his father, who appears to have been a man of superior culture, as he taught his son the elements of physics and mathematics. F.'s first teacher in art was, it is supposed, Allegrette de Nuzio. Subsequently, he went to Florence, and studied under Fiesole. Among his earliest works of note is a fresco of the Madonna in the cathedral of Orvieto. In 1423, he painted an "Adoration of the Kings" for the church of the Holy Trinity in Florence. This picture is one of the most admirable belonging to the school of Giotto. To the same period belongs a Madonna with saints (now in the Berlin museum). F. afterwards went to Venice, where he greatly increased his reputation by a picture of the bloody engagement between the fleet of the republic and that of the emperor Babarossa off the heights of Pirano. The Venetian senate was so delighted with the piece, that it conferred on the fortunate artist the dignity of a patrician, and a pension of a ducat *per diem* for life. Unhappily, this work has perished. Pope Martin V. now called F. to Rome, and employed him, along with Vittore Pisanello, in adorning the church of San Giovanni Laterano. As his share of the work, he painted various incidents in the life of John the Baptist, five prophets, and portraits of pope Martin himself and 10 cardinals. He died, while engaged on this building, some time after 1450. F.'s pictures indicate a cheerful and joyous nature. He had quite a child-like love of splendor and rich ornamentation, but is never extravagant or excessive in his coloring.

FABRI'CE, GEORG FRIEDRICH ALFRED VON, b. 1818; commander of the German army which occupied France in 1871. He was for a long time in the service of Saxony; was secretary of war in 1866, and reorganized the Saxon army after the Prussian plan. He showed admirable administrative ability as well as military genius.

FABRIC'IUS, CAIUS (FABRICIUS) LUSCINUS, a Roman gen., elected consul 282 B.C., and again in 280. He was sent, after the defeat of the Romans by Pyrrhus, to treat for the ransom and exchange of prisoners. Pyrrhus endeavored to bribe him, but all offers were rejected. At a later period, he made peace between the Romans and Pyrrhus.

FABRIC'IUS, or FABRIZIO, GIROLAMO, commonly named from his birthplace F. AB ACQUAPENDENTE, a celebrated anatomist and surgeon, was b. in 1537, and d. in 1619. He was the son of humble parents who, notwithstanding their poverty, sent him to the university of Padua, where, in addition to the usual instruction in the classics, he studied anatomy and surgery under the celebrated Fallopius with such success, that on the death of the latter in 1562, F. was appointed to fill the vacant professorship. He continued to hold this office for nearly half a century, during which period his high character for eloquence, general erudition, and professional knowledge, attracted students from all parts of the civilized world to the university of Padua. Amongst these students was our countryman Harvey (q.v.), who attended his prelections in 1598, and who, as will be seen in our notice of his life, derived from F.'s observations on the valves of the veins the first clue to his great discovery. He was a most laborious investigator of nature; and we find him comparing and contrasting the same organ in man, and in several of the lower animals, on a more methodical plan than had been attempted by any of his predecessors. In this way he treated of the eye, the larynx, the ear, the intestinal canal, the development of the fetus, and many other subjects. The improvements which his knowledge of anatomy enabled him to introduce into the practice of surgery were very great; and his *Opera Chirurgica*, which embraced every complaint curable by manual operation, was so highly valued, that it passed through seventeen editions. He was greatly esteemed by his fellow-citizens, for we find that the Venetian republic not only erected for him a spacious anatomical amphitheater, in which his name was inscribed, but at the same time conferred upon him an annual stipend of a thousand crowns, and created him a knight of the order of St. Mark. A few years before his death he retired with an ample fortune, from all professional duties, and died (some believe he was poisoned by his relatives) at the age of 82, in his ville on the banks of the Brenta, which still bears the name of the Montagnuola d'Acquapendente.

We have not space for a list of his numerous anatomical and surgical works. Upwards of a century after his death (in 1723), the celebrated anatomist Albinus collected and published a complete edition of all his anatomical and physiological works.

FABRIC'IUS, GEORG, 1516–71; b. Saxony; an archæologist. He made a minute examination of the antiquities of Rome, and wrote an elaborate work, so accurate in descriptions that many learned Germans believed it to be from the pen of some ancient writer. In 1553, he was appointed director of the college of Meissen, and held that office till his death.

FABRIC'IUS, JOANNES ALBERTUS, 1668–1736; b. Leipsic; a learned bibliographer. He stands pre-eminent among scholars for a series of literary catalogues entitled *Bibliotheca Latina*, *Bibliotheca Græca*, and *Bibliotheca Antiquaria*. He studied medicine, and afterwards theology; but most of his life was among books. A list of 128 of his works is given, of which, however, the greater part were merely edited.

FABRICIUS, JOH. CHRISTIAN, a Danish entomologist, b. at Tondern, Jan. 7, 1745, and d. at Kiel in 1807. He studied at Copenhagen, Edinburgh, Leyden, and Freyberg, and finally went to Upsala, to attend the classes of Linnæus. A warm friendship was cemented between master and pupil, and throughout his life F. was zealously employed in developing and applying the ideas and method of the great Swede. In 1775, F. was appointed to the chair of natural history at the university of Kiel, and from that time he devoted himself to the prosecution of his entomological studies, and to the fuller development of a system of classification of insects, based upon the structure of the mouth. Although his system has been found inapplicable to many families of insects, the observations on which it was based have tended materially to the extension of this branch of science. The *Systema Entomologiæ* (Copenh. 1775), in which F. expounded his views, constituted a new era in the history of entomology, while his *Genera Insectorum* (Kiel, 1776), *Mantissa Insectorum* (Copenh. 1787), and *Entomologia Systematica* (Copenh. 1792), opened hitherto unexplored fields of inquiry to the entomologist. F. was the author of several able treatises on the policy, statistics, and economy of Denmark, which were prepared by him in his capacity of councilor of state and prof. of rural and political economy at Kiel. F.'s death was said to have been hastened by the grief which he experienced in consequence of the political misfortunes of his country.

FABRO'NI, ANGELO, an excellent biographical writer, was b. at Marradi, in Tuscany, 7th Feb., 1732, educated at Faenza and Rome, and in 1773, was appointed tutor to the sons of Leopold, grand duke of Tuscany. He died 22d Sept., 1803. His *Vitæ Italorum Doctrina Excellentium qui Sæculo XVII. et XVIII. floruerunt* (20 vols., Pisa, 1778–1805), is one of the best Italian works of its kind, and contains quite a treasure of information; while his *Laurentii Medicei Vita* (2 vols., Pisa, 1784), and *Vita Magni Cosmi Medicei* (2 vols., Pisa, 1788–89), are reckoned model biographies.

FABYAN, or FABIAN, ROBERT, b. London, near the middle of the 15th c.; an English chronicler, alderman, and sheriff of London. His *Chronicle* extends from the time when "Brute enterd first the ile of Albion" to the year 1485. The chief value of the work is its details of city government and ceremonial.

FAÇADE (Fr.), the exterior front or face of a building. This term, although frequently restricted to classic architecture, may be applied to the front elevation of a building in any style. It is, however, generally used with reference to buildings of some magnitude and pretensions; thus, we speak of the *front* of a house, and the F. of a palace. The back elevation of an important building is called the rear F., in the same way as in England the back of a house is called the "*back front.*"

An edifice may have any number of façades when it shows a face or front in each direction. An elevation of the side of a building is called the *lateral* façade. The sides of a court or cortile are also called façades, and are distinguished as n., s., etc., façades.

FACCIOLA'TI, JACOPO, an Italian philologist and critic, was b. at Torreglia, not far from Padua, in 1682. He was educated in the religious seminary at Padua, where he became successively prof. of theology, prof. of philosophy, and superintendent-general of the classes, or rector of the institution. F. directed his attention chiefly to the revival of the study of ancient literature, and with this object, brought out a new edition of the *Lexicon Septem Linguarum*, called, from its original author, the monk Ambrosius of Calepio, the *Calepine Lexicon*. He was assisted in this work by his pupil, Forcellini, to whom is mainly owing the conception of a totally new Latin dictionary; an arduous undertaking, which F. continued till his death in 1769, and which was afterwards completed by Forcellini in 1771. F. and Forcellini, assisted by several others, likewise published a new edition of Nizoli's *Thesaurus Ciceronianus*. F.'s Latin epistles and orations are remarkable for the Ciceronian elegance of their style, and his notices on several philosophical writings of Cicero for their solidity, clearness, and taste.

FAC'ET, a term employed to denote the plane surfaces of crystals, or those artificially cut upon precious stones.

FACIAL ANGLE. See ANGLE.

FACIAL NERVE, the seventh cranial nerve in Sömmering's classification, originating in the medulla oblongata, passing through the temporal bone, and issuing from the skull through the stylomastoid foramen. It then branches over the superficial portions of the face, and acts as the muscle of expression. It was formerly classed as a portion of the seventh nerve, the *portio dura*, the other portion being the *portio mollis*, or auditory nerve; according to Sömmering, the 8th pair.

FACIAL NEURALGIA, paroxysmal pains in the head and face, caused by a morbid state of the nervous center, which may be the result of lack of nutrition, of blood-poisoning, or of hereditary predisposition. It may also be caused by irritation from bad teeth, and by inflammation of the facial nerve.

FACIAL PARALYSIS, a paralysis of the facial nerve on which depends the power to move the muscles of the face. One or both sides of the face may be thus affected, and the attack is quite certain to be attended with a partial or entire loss of the power of articulation.

FACILITY, in the legal terminology of Scotland, is a condition of mental weakness short of that which will justify *cognition* (q.v.), but which calls for the protection of the law, which is exercised by means of a process called interdiction (q.v.). The object of interdiction is to prevent the facile person from granting deeds to his own prejudice, and after its has taken place, he cannot contract without the consent of his interdictors. Even without interdiction, the deeds of a facile person, if to his prejudice, may be set aside, if there be proof of his having been circumvented or imposed on; and Erskine says that "where lesion in the deed, and facility in the granter concur, the most slender circumstances of fraud or circumvention are sufficient to set a deed aside."—B. iv. tit. 1, s. 27. See FRAUD, LESION, INSANITY. There is no corresponding term in English law, and the remedy of interdiction is unknown, but weakness of mind approaching to idiocy will, of course, form an important element in proving fraud.

FACTOR, in mathematics. The numbers 6 and 4, multiplied together, *make* 24; hence 6 and 4 are called *factors* of the product 24. Most numbers are products of two or more factors; thus $10=2\times5$; $12=3\times4$, or 2×6, or $2\times2\times3$. Every product can be divided by any of its factors without remainder; a factor, therefore, is often called a *divisor*, or measure. 2, 3, 4, 6, 8, 12, are all factors or divisors of 24. Numbers that have no factor or divisor above unity, such as 2, 3, 5, 7, 11, . . . 23, etc., are called *prime* numbers. See NUMBERS, THEORY OF.

FACTOR, in its most general sense, is the term applied to any one whc is employed to do business for another. Factory differs from the mandate of the Roman law in not being gratuitous. In mercantile transactions, the sale of goods is generally effected either by factors or brokers, both of whom are agents, remunerated generally by a commission. But the powers of factors are higher than those of brokers, inasmuch as the former are intrusted with the possession of the goods, and authorized to sell them as if they were their own; whereas the latter have no possession or apparent ownership, but act not only really but ostensibly as agents. Factors frequently act on the principle of the *del credere commission* (q.v.), receiving, that is to say, a higher remuneration in consideration of undertaking to guarantee the solvency of the purchasers. At common law, a sale or other transaction by a F. was bad, if it was not fully warranted by the nature of the authority which he derived from his principal; but this doctrine has been modified by several statutes which have been passed for the protection of strangers dealing with persons intrusted with the possession of goods, the extent of whose authority they had no means of ascertaining. By 6 Geo. IV. c. 94, called the factors' act, it was provided that any person in possession of a bill of lading is to be deemed the true owner of the goods therein described, so far as to give validity to any contract or agreement made with him regarding them. 7 and 8 Geo. IV. enacts that if any F. shall, for his own benefit, and in violation of good faith, deposit or pledge any goods, or order for their delivery, he shall be guilty of a misdemeanor. In 1842, the powers of 6 Geo. IV. c. 94, were defined and extended by 5 and 6 Vict. c. 39, which enacted that *bonâ fide* advances to persons intrusted with the possession of goods or documents of title, though known to be agents, should be protected; *bonâ fide* deposits in exchange were also protected, but it was provided that there should be no lien beyond the value of the goods given up. The agent's responsibility to his principal is not diminished, but it is provided that if he shall make consignments contrary to the instructions of his principal, he shall be guilty of a misdemeanor.

In Scotland, the term factor is applied to an agent managing heritable estates for another, letting farms, drawing rents, and the like, in which sense it is nearly synonymous with the English *steward*, a term which, in Scotland, again, is employed to denote an agent whose powers are of a far more limited kind than those of a F., and who generally acts under him. If a F. pay money into a bank on his own account, he takes the risk of the bank's failure. A F. cannot delegate his powers, but he may employ a third party to aid him in their discharge. He binds his principal to any engagement which he contracts within his powers. Factory may be recalled, and falls by the death of the principal; but actions already begun may go on, and those done in ignorance of the revocation or death are binding. Revocation is implied in the appoint-

ment of a new agent to do the same act. The mandate of factory subsists notwithstanding the supervening insanity of the mandant. Factors may be empowered to grant leases and pursue removings, but for these acts special powers are required. Writers to the signet in Edinburgh, and writers in country towns, frequently act as factors for the neighboring landed proprietors. In 1877, an act was passed to remove doubts and amend the previous factors acts (1823–77). See AGENT; JUDICIAL FACTOR.

FACTOR (*ante*), a man employed to sell the goods of another; in the United States usually called a commission merchant, because he has his compensation in a commission or percentage upon the goods he sells. He differs from a broker in that he has actual possession of the goods of his principal, and is empowered to deliver them to the purchaser precisely as if they were his own. He generally buys and sells in his own name, so that those dealing with him may not know whether he is owner or factor. Under some limitations for self-protection, he is bound by the instructions of his principal and responsible for damages arising from a violation thereof. A factor is entitled to his commissions only after he has rendered the full service by which they were to be earned. He is responsible to his principal for losses incurred by want of ordinary care and skill in the transaction of business. In the absence of particular instructions he must follow the established rules and methods of the business in which he is engaged. He cannot delegate his authority without express permission of his principal, except in conformity to general usage or by stress of peculiar circumstances. His discretion is large, but he is bound to use it with due regard to the interest of his principal. He cannot sell goods at a sacrifice for the purpose of obtaining his commissions and advances. It is generally held in the United States that a factor who has made advances upon goods acquires such an interest in them that the principal cannot take them out of his possession by a revocation of his authority. The latter can sell enough of them to reimburse himself, the principal having power over the remainder. In many American states, a factor is deemed to be the true owner in the sense that sales made by him to purchasers acting in good faith are valid. Generally he acts under what is called a "guarantee," or "commission," i.e., a commission received as a consideration for guaranteeing to the principal payment for the goods which he sells. A factor whose principal resides in a foreign country stands to purchasers, in most respects, in the relation of an absolute owner. If a factor commits any wrongful act in a sale, the principal has the right to recover his goods wherever he can trace them, unless they are in possession of one who purchased them in good faith.

FACTORIES are establishments where large numbers of persons co-operate in the production of some article of consumption, the principle of the division of labor being in all cases applied, and generally machinery to a greater or less extent. The factory system is opposed to the practice of individual labor at the homes of the artisans. Every production of art requires a longer or shorter series of operations, often varying considerably in their nature. The hand-worker performs most of these himself; one and the same person makes the complete article. In a factory, every article goes through as many hands or machines as there are separate processes required; each workman performs only one, and that always the same, process. The chief advantages of this way of proceeding are the following: Loss of time is avoided in passing from one operation to another, a loss which is the greater, the greater the difference in the nature of the operation. The workman, confined to one thing, in itself usually simple, not only learns it sooner, but attains a quickness and skill that one distracted with a variety of operations can never attain; besides, the constant occupation with one kind of work leads the workman to light upon improvements in tools and machines so as to increase their rapidity of execution and their precision. As only few of the processes are very difficult, it is possible to turn to some account less skillful workmen, and even children, and to assign to each person that kind of work at which he is most effective. All parts of the work, too, that are quite uniform in the case of each article, can generally be done by machinery. Lastly, in F., there is more opportunity of turning to advantage all kinds of refuse.

A necessary consequence of these advantages is, that the cost of production is less on the factory system than in the other way; and more than that, the articles themselves, when of a nature adapted to this mode of production, are better, and of a uniformity otherwise unattainable. Wherever a comparatively homogeneous material has to be made into a large number of uniform articles, there the factory system is in its proper place. The best examples are spinning, weaving, cloth-printing, pin and needle making, etc. But even in the manufacture of complex articles composed of different kinds of material, the factory system may be pursued with advantage whenever the number of the articles required is great, and the separate parts of such a kind that a great number can be made exactly alike. This is the case with watches, weapons, locks, etc. Such a manufacture divides itself into as many separate employments as there are parts in each article, and the putting together and adjusting forms another. The degree of complexity is carried still further in such cases as the manufacture of carriages, where operations of the most heterogeneous kind have to concur. In some cases, F. do not concern themselves with the putting together of the parts, but merely produce them for hand-workers and special professionists, as is the case in watch-mak-

ing. In making clothes and shoes and the like, where each individual article requires special adaptation, factory work is not so suitable. How far it is advisable in any case to employ machinery, depends on the nature of the work, the cost of the machinery, the scale on which operations are to be carried on, etc. Nowhere have the factory system and the employment of machinery been carried further than in America. In Cincinnati, for instance, one establishment has produced 200 doz. chairs a week, another 1000 bedsteads, most of the work being done by machinery; and one boot and shoe factory has used 600 bushels of shoe-pegs. Even the killing of pigs is done on this grand scale; one firm at Chicago killing and packing 373,725 hogs in four months.—F. cannot succeed in great numbers except in localities where the population is sufficiently dense to afford a sufficient choice of hands, and also to cause a comparatively low rate of wages. Other conditions of a good locality for factory production are abundance of water-power or the presence of coal for steam power, nearness to the raw material, and good communications.

While the rise and extension of the factory system, when looked at from the point of view of material economics, must be pronounced a decided improvement, it cannot be denied that, socially and politically considered, it has its dark side. The greater the capital and the training necessary for carrying on an extensive establishment, the less prospect the workman has of ever raising himself to independence. The chasm that separates the mill-owner from his dependants is infinitely greater than that which exists between a master artisan and his journeymen. The hope of gradual advancement afforded in the last case supplies a powerful moral support and means of discipline; the impassible gulf in the other acts as a stumbling-block and temptation. Factory-workers are especially disposed to enter heedlessly into marriage, as they require to make no provision for a workshop, tools, and other outlay once necessary for entering life; while they have the prospect of the wife, and soon of the children, as contributors to the support of the family. It may, at all events, be affirmed, that the increase and accumulation in masses of the class called *proletaires*, who have no provision for a week but the labor of that week, is favored by the factory system. Moreover, the employment of wife and child as fellow-laborers endangers the old and sacred bonds of the family; the father can no longer remain, to the extent that he ought to be, master of the house of which he is no longer the sole support; and how much the family affection is thus weakened, is painfully exhibited in the ill-treatment of the younger children, who are prematurely put to labor, and literally robbed of their childhood. At the same time, it cannot be allowed that these evils are incapable of remedy; legislation and public opinion can here do much; nor must it be forgotten that the evil is not peculiar to factory labor, but is a feature of the whole of our more recent industrial economics. The greatest abuses of the kind in England are found in the mining districts, and among the small domestic manufacturers. The very circumstances that give rise to the evils afford the means of obviating them, if they were only taken advantage of; for, the larger the establishment, the more good can an owner do for his people, and the less it is possible to conceal abuses. It cannot with justice be charged against factory labor that in itself it has a demoralizing tendency. Whatever brings together numbers of human beings increases, no doubt, opportunities and temptations to aberrations, especially in the intercourse of the sexes; but not more so in the case of a factory than in that of all large towns, and even less so than in some other cases of assemblage, as armies and garrisons.

FACTORY ACTS. From motives of humanity, several statutes have been passed in recent years for regulating the hours of work, preserving the health, and promoting the education of young persons employed in mills and factories. The leading act is 7 and 8 Vict. c. 15; though much had already been done by the old statute 42 Geo. III. c. 73, and by 3 and 4 Will. IV. c. 103, commonly called the factory act, amended by 4 Will. IV. c. 1. By these ast-mentioned acts, night-work—that is, between half-past eight in the evening and half-past five in the morning—was, with some exceptions, forbidden in the case of persons under 18 years of age; whilst their hours of labor were limited to 12 in the day, including one and a half hours for meals. The employment of children under 9 was prohibited, except in silk-mills; and under 13 the hours were restricted to eight a day, or ten in silk-mills. Holidays were allowed, and certificates of health required from a surgeon or physician previous to the admission of a child into a factory, under certain penalties. By 3 and 4 Will. IV. c. 103, also, inspectors of factories were appointed, and their powers and duties for its enforcement defined. Amongst the duties of the inspector was included that of seeing that every child within the restricted age was placed at school; and in case of the parents or guardians of the child omitting to provide for his education, to order the employer to pay to him (the inspector) one penny in every shilling of the weekly wages of the child, to be applied to that purpose. By 7 and 8 Vict. c. 15, the powers and duties of inspectors were more accurately set forth. Regulations are laid down for the protection of children working in web-spinning flax-mills, and it is enacted that the mill-gearing shall not be cleaned while in motion, and that the machinery shall be guarded. A child is defined to mean a person under 13; and a young person, one between the ages of 13 and 18. An abstract of the act and relative notices must be hung up in every factory. As to the time of children's

work, it is provided that they shall not be employed more than six hours and 30 minutes in any one day, or seven in silk factories; but they may be employed ten hours in one day on three alternate days of the week, provided that they be not employed in any manner in the same, or any other factory, on two successive days, or after half-past four on a Saturday. On the vacant days, the children are to be sent to school for five hours, provided the day be not a Saturday, when no school attendance of any child shall be required. Women above the age of 18 are to be employed as young persons; and work for all children and young persons is to cease on Saturday at half-past four. In addition to the regulations of the former act, it is provided regarding meal-times, that the hours allowed shall be between half-past seven in the morning, and half-past seven in the evening, and that one hour shall be before three o'clock. No child or young person shall be employed more than five hours before one o'clock without an interval for meal-time of at least 30 minutes. All young persons are to have their meal-times at the same hour, and are not to be allowed to remain in any of the rooms used for manufacturing processes. Eight half-holidays are to be given in every factory, in addition to Good-Friday and Christmas-day, and the sacramental fast-day in Scotch parishes. By the subsequent act, 16 and 17 Vict. c. 102, it is required that no person under 13 shall be employed in a factory before six o'clock in the morning or after six in the evening; or on Saturday after two o'clock; but between Sept. 30 and April 1, children may for one month be employed on any day but Saturday from seven in the morning till seven in the evening. By 8 and 9 Vict. c. 29, the powers of inspectors and the regulations in respect to the employment of women and children, are extended to calico-works; and rope-works are expressly exempted from them by 9 and 10 Vict. c. 40. By 10 Vict. c. 29, the hours of labor for young persons, and women above the age of 18, are reduced from 12, which the factory act had fixed, to 10, after 1st May, 1848; and by 13 and 14 Vict. c. 37, it is enacted that the same persons shall not be employed before six in the morning or after six in the evening, or after two o'clock on a Saturday. Meal-times must be between half-past seven in the morning and six in the evening. By 13 and 14 Vict. c. 37, children above 11 are to be viewed as young persons when employed in winding and throwing silk. 19 and 20 Vict. c. 38, limits the provisions of 7 and 8 Vict. c. 15, as to mill-gearing, to those parts with which children and young persons and women are liable to come in contact. By subsequent legislation, the provisions of the acts have been modified and extended. See WORKSHOP REGULATION ACT.

FACTORY ACTS. In 1876, the royal commission on factory and workshop acts reported that previous legislation had been to a large extent successful; and that, while some occupations were still undoubtedly unhealthy in spite of the sanitary regulations of these acts, the cases in which young children were employed in labor unfitted for their years, or in which young persons and women suffered physically from overwork, had become uncommon. The commissioners, however, proposed large changes in the law, and in particular they proposed the consolidation of the law, which was then dispersed through fifteen statutes, one of them, passed in the year 1802, requiring all apprentices in cotton and woolen factories to be instructed in the principles of the Christian religion. This has been accomplished by the factory and workshop act, 1878, 41 Vict. c. 16, which deals with five classes of works: (1) Textile factories, which remain very much under the regulations enacted by the factory acts of 1844, 1861, and 1874: (2) Non-textile factories, which include the occupations enumerated in the factory acts extension act, 1864, and the workshops act, 1867, whether using mechanical power or not, and also all occupations, not named in these acts, in which mechanical power is used: (3) Workshops, or all unnamed occupations, in which mechanical power is not used, except those named in the acts of 1864 and 1867: (4) Workshops in which none but women above the age of eighteen are employed: (5) Domestic workshops, in which the work is carried on in a private house, room, or place in which the only persons employed are members of the same family dwelling there. In class (1), where power is used, and the large majority of workers are women and children, the highest degree of regulation is reached. In class (2), where the labor is not so hard, or the strain of attendance on the moving power not so heavy, the statutory hours of work are somewhat relaxed, but education and sanitary provisions are still compulsory. In class (3), registers of children and young persons, and certificates of age and fitness, are, except in special circumstances, dispensed with. In class (4), the hours for work and meals may be changed, and the sanitary authority is responsible for the sanitary state of the shop. In class (5), there is still greater elasticity as regards hours for work and meals; the medical officer of health inspects the sanitary condition, but the employment of women is entirely unrestricted. The chief textile factories are those for the manufacture of cotton, wool, hair, silk, flax, hemp, jute, tow, China-grass, cocoa-nut fiber, or similar materials, either separately or in combination, or of any fabric made from these materials. The chief non-textile factories are print works, bleaching and dyeing works, earthenware works, lucifer-match, percussion-cap, and cartridge works, paper-staining works, fustian-cutting works, blast-furnaces, copper and iron mills, foundries of all kinds, metal and india-rubber works, paper-mills (including mills for converting cotton-waste into half-stuff), glass works, tobacco factories, letter-press printing works, book-binding works, and flax scutch-mills. The expression non-textile factory also includes

any premises in which manual labor is exercised in making, repairing, altering, ornamenting, or adapting for sale any article, and in which the manufacturing process is assisted by mechanical power. A workshop, again, is any premises, room, or place where manual labor is exercised for these purposes, and to which the employer of the persons working there has the right of access, or over which he has a right of control. The following premises or places are considered to be non-textile factories, if they have mechanical power to aid the manufacturing process; workshops, if they have not—namely, hat works, rope works (where mechanical power is not used to draw and spin the fibers), bakehouses, lace warehouses (where the process is entirely subsequent to the making of lace on a lace machine), ship-building yards, quarries, and pit-banks (not under the restrictions of the coal mines regulation act). A place used solely as a dwelling, a part of a factory used solely for some purpose different from the process carried on in the factory, and a school, are not considered to be workshops or factories. Straw-plaiting, pillow lace-making, glove-making, and some other handicrafts of a light character, may be carried on by a family in a private house or room, without fixing on the premises the legal liability of a workshop. Again, if the manual labor is exercised only at irregular intervals, and does not furnish the principal means of living to the family, the house will not become a workshop. The act does not apply to persons merely engaged to repair machinery in a factory.

In considering the main provisions of the act of 1878, it must be kept in view that a "factory" means a place in which machinery is moved by the aid of steam, water, or other mechanical power; a "child" means a person under the age of 14 years; a "young person" means a person between 14 and 18 years of age; a "woman" means a woman of 18 years and upwards; "parent" includes the person having the custody or control of any child; "night" means the period between 9 P.M. and 6 A.M. The general *sanitary provision* applicable to all factories and workshops is, that they shall be clean, free from effluvia, not overcrowded, and ventilated so as to render harmless, so far as practicable, the gases, vapors, dust, etc., which are generated in the process and are injurious to health. Where anything is wrong, the factory inspector gives notice to the sanitary (local) authority. Every factory is to be lime-washed once in 14 months, unless painted in oil once in 7 years, when it must be washed once in 14 months. The inspector may order fans to be used where dust is generated by grinding, glazing, or polishing on a wheel. Special provision is made for the painting of bakehouses, and for the protection of workers in the wet-spinning process. The obligation to fence factory machinery in an efficient manner applies to every hoist or teagle near to which any person is liable to be employed, every fly-wheel connected with mechanical power, every part of a steam-engine and water-wheel, and every wheel-race. The inspector may also require the fencing of any driving-strap, or band, or other part of machinery which he considers dangerous, or of any vat, pan, or other structure filled with hot liquid or molten metal so as to be a likely source of danger to the protected classes. Children must not be set to clean any part of the machinery while in motion; as regards young persons and women, the prohibition extends only to mill-gearing. No work is to be done between the fixed and traversing parts of a self-acting machine while moved by mechanical power. The general rules for the employment of young persons and women in textile factories are 6 A.M. to 6 P.M., or 7 A.M. to 7 P.M., except on Saturdays, and on Saturdays 6 A.M. to 12.30 or 1 P.M. (according to the time allowed for meals), or 7 A.M. to 1.30 P.M. Two hours (one of them before 3 P.M.) must be allowed for meals on every day except Saturday, on which half an hour is sufficient. The employment is not to be continuous for more than 4½ hours without an interval of half an hour for meals. The variations on these rules for young persons and women in a non-textile factory, and for young persons in a workshop, are that the minimum time for meals is reduced to 1½ hour, and the period of continuous employment is extended to 5 hours. As regards children in textile factories, they must be employed on the system of morning and afternoon sets, or on that of alternate days. Their morning set ends at 1 P.M., or dinner-time, if that is earlier; the afternoon set begins at 1 P.M., or after dinner, if that is later. The Saturday hours for children are the same as for others. Neither set is to be continued more than seven days, and no child may be employed on two successive Saturdays. Under the alternate day system, the hours for employment and meals are the same as for young persons. In workshops in which neither children nor young persons are employed, the hours for women are 6 A.M. to 9 P.M., with 4½ hours for meals and absence for work; and on Saturdays, 6 A.M. to 4 P.M., with 2½ hours for these purposes. As regards *domestic* workshops, the most important specialty is that the alternate system for children may not be used. The actual times for work and meals are not fixed, but overtime is prohibited, and the shops remain under the sanitary supervision of the local authority. The two points fixed by statute with reference to meals in factories and workshops generally are: That the three classes of children, young persons, and women must have their meals at the same hour; that during that hour none of them is allowed to remain in a room where the manufacturing process is being carried on. In every factory and workshop the period of employment, prohibitions, meal-hours, and system of children's labor, must all be published in a notice put up within the premises. Employment of children under ten, and of any of the protected classes on Sunday, is prohibited. The occupier is also bound to give eight half

holidays in every year, besides (in Scotland) the sacramental fasts. In trades carried on in connection with the retail business, the home secretary may authorize the giving of separate holidays to different classes of workers; and in other cases (e.g., in provincial towns where Saturday is the market-day) he may substitute another week-day for the Saturday half-holiday. A child, employed on the morning and afternoon set, must give one school attendance on each work day, and, if employed on the alternate day system, two attendances on each non-working day. The penalty is that the child cannot be employed in the following week before the deficiency in attendances has been made up. It is the duty of the employer to get every week from the teacher a certificate of attendance. He may also be obliged to pay to the school-manager a sum not exceeding 3*d.* a week, or one twelfth part of the child's weekly wages. A child of 13, however, on obtaining a certificate of proficiency, will be treated as a young person. No child or young person under the age of 16, is to be employed in a factory for more than seven days without a certificate of age and physical fitness granted after personal examination by the medical officer or certifying surgeon of the district. When an accident occurs in a factory or workshop which causes loss of life, or prevents the person injured resuming work within 48 hours, notice must be given to the inspector and the medical officer or certifying surgeon, the latter of whom must go at once to the premises and report to the inspector on the nature and cause of the death or injury.

It is impossible to mention all the special restrictions which the act imposes. For instance, no children or young persons are allowed to work at silvering mirrors by the mercurial process, making white lead, melting or annealing glass. Children must not be employed in dipping lucifer matches, or dry grinding in the metal trade. Girls must not be employed in making or finishing bricks or salt. In glass and earthenware works and others, certain parts of the works must not be used for taking meals. The home secretary has power to extend such restrictions to other unwholesome occupations. Again, where the customs and exigences of a trade require it, the home secretary may alter the hours of labor to 8 A.M. and 8 P.M., or even 9 A.M. and 9 P.M. Of the first class, lithographic printing, envelope making, biscuit making, and bookbinding are examples; of the second, the straw-hat making at Luton, and warehouses in London and elsewhere.

The administration of the act is carried on by inspectors, appointed and paid by government. They have large powers of entering factories, workshops, and schools, of asking for documents, of examining persons on oath. A special warrant is required to enter a dwelling-house. The inspectors report to government annually. The certifying surgeons appointed by the inspectors are entitled to charge for their statutory duties certain fees, which are paid by the employer, but which he may deduct from wages.

FACTORY ACTS (*ante*), laws enacted for the protection of persons working in factories, limiting the hours of labor, limiting the age at which children are permitted to engage in such work, and requiring them to have a certain amount of school instruction. Legislation of this kind in states where factories abound has been deemed necessary for moral and sanitary reasons.

FACULÆ (Lat. *facula*, a torch), in astronomy, are spots, brighter than the rest of the surface, which are sometimes seen on the sun's disk. See SUN.

FACULTIES, COURT OF, a court established by 25 Hen. VIII. c. 21, s. 4, whereby authority is given to the archbishop of Canterbury and his successors to grant dispensations, faculties, etc., by himself, or his sufficient and substantial commissary or deputy, for any such matters not being repugnant to the holy Scriptures and the laws of God, whereof before such dispensations, etc., had been accustomed to be had at the see of Rome. Up to the time of passing this act, the pope, notwithstanding the statutes which had been passed restraining his authority, continued to exercise his power, and to draw a considerable revenue for indulgences, etc. The chief officer of the court is called *magister ad facultates*. The sittings of the court have always been held at Doctors Commons (q.v.). On its first institution, there were various matters in which the dispensing power was called into exercise—such as the power to hold two or more livings (see PLURALISM), and the permission to eat flesh in Lent, etc. But of late years the matter which has chiefly occupied the court has been the granting license to marry without publication of banns. See LICENSE, MARRIAGE, DISPENSATION.

FACULTY. See UNIVERSITY.

FACULTY, a name applied to certain aptitudes or powers of the mind, especially those of the intellect. Reid considered that the characteristic of a faculty was its *primitive* character, as opposed to the acquired powers, or habits. Sir W. Hamilton remarks on this distinction as follows: "Powers are *active* and *passive*, *natural* and *acquired*. Powers natural and active are called *faculties*. Powers natural and passive, *capacities* or *receptivities*. Powers acquired are habits, and habit is used both in an active and passive sense."—Reid, p. 221. Hence, in discussing the intellect, whatever are considered its primary or fundamental functions, are its faculties. Perception, memory, reasoning, imagination, are the leading intellectual faculties, according to the older metaphysicians, who followed the popular classification. These would not now be con-

sidered as giving the ultimate analysis of the intellect. Conscience, or the moral sense, has sometimes been called the *moral* faculty. See INTELLECT.

FACULTY, GRANT OF, BY THE ORDINARY, an order by the bishop of a diocese to award some privilege not permitted by common law. A faculty is necessary in order to effect any important alteration in a church, such as the erection of a gallery or of an organ. Without a faculty, a person is not entitled to erect a monument within the walls of a church. But a monument having been put up, though without a faculty, cannot be removed till a faculty or order to that effect has been obtained. By the common law of England, every parishioner is entitled to a seat in church, but no one has a claim to any particular seat, unless the right has been given by a faculty. See PEWS.

FACULTY OF ADVOCATES. See ADVOCATES.

FÆCES, or SOLID EXCREMENTS, are the matters which an animal ejects from the lower end of the intestinal canal, and in greater part, consist of those portions of food which, on passing through the alimentary canal, have been rejected as comparatively worthless in the office of nutrition. In the higher animals, the F. generally contain about three fourths of their weight of water, the remaining one fourth consisting, in greater part, of organic remains; in the case of the ox, sheep, and other herbivorous animals, of undigested woody fiber. In the human subject, the quantity of F. yielded daily by an average healthy man is 5 to 6 ozs.; the peculiar brown color is due to the presence of decomposing biliary matter, and the odor to partially changed nitrogenous substances resembling casein. The following table gives the composition of human and ox fæces:

HUMAN.		OX.	
Water	73.3	Water	70.00
Organic remains	7.0	Woody fiber	22.50
Biliary and nitrogenous matter	14.9	Wax	0.76
Albumen	0.9	Sugar	3.00
Extract	2.7	Albumen	2.00
Salts	1.2	Resin and salts	1.74

For use as manure, these F. are of little value as compared with guano, dissolved bones, or superphosphates, and, indeed, the principal effete matters of importance to the agriculturist are resident in the urine or liquid excrement of the higher animals. In the case, however, of birds and reptiles, the urine and F. are voided together more or less moist, and hence the richness of such excrementitious matter, and its high agricultural value. See GUANO. The following table gives the composition of the F. of the boa constrictor:

Uric acid	90.16
Ammonia	1.70
Potash	3.45
Sulphate of potash	0.95
Phosphate of lime, etc.	0.80
Mucus and coloring matter	2.94
	100.00

FAED, JOHN, a popular Scottish painter, was b. in 1820 at Burley Mill, in the stewartry of Kirkcudbright where his father was an engineer and millwright. His love of art was manifested at an early period, and when hardly entered on his teens, he was in the habit of making tours through the villages of Galloway, painting miniatures. In 1841, he came to Edinburgh, where his talents ultimately won him a high reputation. The first picture of F.'s that obtained great popularity was "The Cruel Sisters" (1851). Since then, F. has executed, among other works, "Shakespeare and his Contemporaries," "The Cotter's Saturday Night," and "The Soldier's Return;" and, since coming to London in 1864, "The Wappenschaw," "The Old Style," "Tam o' Shanter," "Haddon Hall of Old," "The Stirrup Cup," "John Anderson my Jo," "The Gamekeeper's Daughter," and "The Hiring Fair."

FAED, THOMAS, brother of the preceding, was b. at Burley Mill in 1826, and has also followed the career of an artist. One of his earliest efforts was a drawing (in water-colors) from the *Old English Baron.* In 1849, he became an associate of the royal Scottish academy, and shortly after executed a very attractive work, entitled "Scott and his Friends at Abbotsford." In 1852, he removed to London, where his "Mitherless Bairn," exhibited in 1855, was declared by the critics to be "the picture of the season." Of his subsequent works, we need only mention "Home and the Homeless," "The First Break in the Family," "Sunday in the Backwoods," "From Dawn to Sunset," "Baith Faither and Mither," and "The Last o' the Clan." F. was made A.R.A. in 1859, R.A. in 1864, and elected an honorary member of the Vienna royal academy in 1875.

FAEN'ZA, a t. of Italy, 20 m. S.W. of Ravenna, is on the left bank of the Lamone, in a beautiful plain. It is built in the form of a square divided by four great streets,

which meet in the center. Among the chief buildings are an imposing cathedral, a fine market-place surrounded with arcades and adorned with a fountain, and numerous palaces and ecclesiastical edifices. Its manufacture of glazed and colored earthenware vessels, in Italy called "majolica," and in France "faience" (q.v.), has declined in importance, and its chief industry now is the making of silk, linen, and paper. Pop. '72, 36,299.

F., the ancient *Faventia*, was at one period a town of the Boii, was afterwards a *municipium* under the Romans, and was annexed to the states of the church in the 15th c. by pope Alexander VI., in which condition it remained till 1860, when, with the Emilian provinces, it was annexed to the kingdom of Italy under Victor Emmanuel.

FÆSULÆ. See FIESOLE, *ante*.

FAGGING is the name given to a usage peculiar to the great public schools of England, the nature of which will be presently described. The origin of the practice cannot be traced. No school statutes refer to it, no school traditions speak of a time when it was not. The statutes of Eton college rather indicate precaution against it, for they ordain that there be thirteen poor youths in the establishment to work for the college; but in Edward IV.'s time the college was much impoverished by royal depredations—the fellowships were cut down from ten to seven, and these *pauperes juniores* abolished. However, be the origin what it may, the institution, as we have said, exists, and in very nearly the same form, in all the public schools—that is to say, Eton, Harrow, Westminster, Winchester, and Rugby. Its main features are in every case much as follows: In each school there are two limits: the upper limit extending to the bottom of the first one or two forms (the public school designation of classes), below which a boy may not fag; and the lower limit, comprising the last four or five of the lowest forms, above which a boy may not be fagged. The boys between these limits, as also those who, although comprised within the lower limit, have been more than a certain time in the school, are devoid alike of rights and duties in connection with this practice. The services of a fag are of two kinds—the one comprising his duties to a special master, to whom he has been assigned; the other consisting of those due to the whole of the upper boys. The former comprise such tasks as preparing his master's breakfast, stoking his master's fire, carrying his master's messages, and smuggling into the house little forbidden delicacies for his master's consumption, and in this instance, if detected, bearing his master's punishment. Those services which a lower boy owes to the whole of the upper boys, consist of attendance at the games. In the cricket season, the fags perform the functions of a net, and stand behind the wickets to stop the balls while their seniors are practicing; and at all seasons they are liable to the drearier task of waiting attendance on the racket-players, and retrieving the balls which have been "skyed" out of the court. All cases of difficulty arising out of fagging are within the jurisdiction of the head-boy in the house, or the head of the school, and are settled by reference to him. Such are the main features of F. at the present day—the idea pervading the institution being, that no boy should be liable to the performance of any duties really menial, but only such as, in the absence of the practice, would naturally be performed by each boy for himself. Many of the abuses of this practice, which have from time to time been discovered and suppressed, afford whimsical illustrations of the peccant ingenuity of boy-nature. In one school, a senior boy once had a study, but was not studious; he might have let it out to a younger boy in want of a crib to read in at a rent of some five or ten shillings a term, but his mind soared beyond such paltry dealings; he conceived vaster and grander ideas of the management of his property: he set up a tap. He smuggled into his room a nine-gallon cask, called a "governo." There was a rapid succession of governors, and a brisk demand for beer; so he appointed his fag, a fine stout lad, as deputy-tapster to receive the coppers. The deputy grew attached to both his governors, and flourished long and happily in the faithful discharge of his duties. Another instance consisted of an equally whimsical and widely different exercise of power. A sixth-form boy, of high-church principles, made his fags, two very nice well-conditioned young scholars, get up early and come to his room every morning before school for prayers.

So prominent a feature in the constitution of English public schools as the institution of F., has, of course, received much criticism from educational reformers. The well-known author of the letters from Paterfamilias to the *Cornhill Magazine*, himself an Etonian, and one of those rare instances of a public-school man dissatisfied with the recollections of his school-life, speaks of the practice with the greatest bitterness. "Fagging," says he, "now happily almost obsolete, was also based upon the breeches-pocket question. I used often to doubt, when called off from my studies, whilst a lower boy at Harchester, to mend my master's fire, to prepare his meals, or to brush his clothes, whether a system which permitted and upheld such practices could really be beneficial to him or to me: but I never had any doubt that it was very beneficial to our tutor, inasmuch as it spared him the wages of some two or three servants, whose menial work was performed by the lower boys. Of course, the ingenuity of our masters discovered plenty of excellent arguments in support of practices so convenient to themselves; our parents used to be told that carrying coals for the upper boys, and toasting their muffins, made us helpful and docile, and took the nonsense out of bumptious lads; but such arguments would have applied just as aptly towards establishing the propriety

of setting young noblemen and gentlemen to assist the scullion, or to sort out the dirty linen for the wash." These are certainly sharp words, but doubtless many persons may be found to sympathize with a great deal of the censure contained in them. They will tell us that much vigilance is necessary to prevent the abuse of the power of exacting casual service on the part of the senior boys, and that the rules of F., such as they are, give no adequate security against serious vexation and waste of a small boy's time. They say that the favorite apology, on the ground of its taking the conceit out of those who have been spoiled at home, is fallacious; that football and parsing are sufficient curatives of this evil tone of mind; and that if the necessity to render service to a senior takes the conceit out, the subsequent privilege of the early exercise of power only too rapidly pours it in again. They deny, also, the validity of one very favorite assertion of the upholders of the system, that the relation between master and fag often, and indeed generally, gives rise to very pleasant intimacies between the upper and lower boys, and intimacies very beneficial to the latter. On the contrary, they maintain that no case of attachment between master and fag can be pointed to which would not have existed under any circumstances, and that this relation may often be found to have marred what would otherwise have been a very friendly recollection. The advocates of the system tells us, on the other hand, that the attendant evils are greatly exaggerated, and in some cases purely fictitious, while it is in many respects of very great, if not essential, service to the existence of a public school. They deny that it has been originated and upheld by the tutors from purely commercial considerations, as asserted by Paterfamilias; for, as has been already said, no really menial services are exacted of any boy, but only such as each boy might reasonably be expected to perform for himself, inasmuch as, in point of fact, many men at the university—not choosing or not being able to afford a gyp—do really prepare their own breakfast, stoke their own fires, and go on their own errands. That while abuses do occasionally occur, everything is against the probability of their frequency or extent, as the utmost facility exists on the part of the juniors for bringing their grievances before the proper authorities, and obtaining speedy redress. They say that, as a fact, the services of a fag are so light that he does not care or think about them, and they appeal in support of this statement to the tone in which the boys themselves are in the habit of referring to the subject. See the *Etonian*, a periodical published by some Eton boys 30 or 40 years ago; and the *Triumvirate*, a similar and more modern periodical from Harrow school. But the principal argument in the defense of the system must always rest, its supporters tell us, upon the security afforded by it against bullying. In public schools, where the ages of the boys vary from 10 to 20, a much greater liberty is given to the boys, and much greater confidence is reposed in them than in private schools—the idea being, that their characters can only be truly formed by as unrestricted intercourse as possible among themselves, not hampered by the constant presence of a superior. This constant presence of a master is, therefore, replaced by the traditions and constitution of the school, in which each boy has his assigned position, and his definite rights and duties; a constitution, therefore, which each boy feels a personal interest in upholding. Such a society necessarily requires a provision for the relation between older and younger boys, between the weaker and the stronger; for, in the absence of this, the ordinary aspects of barbarism would be presented, and brute force be alone predominant. Such a provision, acceptable and intelligible to the boys, and reasonable in itself, is believed to be found in the F. system. By this system, it is affirmed, provision is made alike for the claims of age and intellect, inasmuch as it is scarcely possible that any very stupid boy should fag, while no very old boy ever can be fagged.

These are the chief features of the F. system at public schools, and the principal arguments for it and against it. See PENNALISM.

FAGNA'NI, JOSEPH, 1819–73; an American artist, b. Italy. He studied in Vienna and Paris, and came to the United States with sir Henry Bulwer in 1849, and, in 1851, married an American wife. He returned to Europe and made portraits of a large number of public characters, among them Victor Emanuel, Abdul Aziz, Garibaldi, the empress Eugénie, and Ali Pasha. On returning to New York, he painted a series called "The Nine Muses."

FAGUS. See BEECH, *ante*.

FAHLCRANTZ, KARL JOHAN, 1774–1861; b. Sweden; a self-taught painter, whose landscapes were pronounced the best produced in his country.

FAHR'ENHEIT, GABRIEL DANIEL, the improver of the thermometer, was b. at Dantzic about the end of the 17th c., and was originally designed for the commercial profession. His inclination for natural philosophy induced him to quit that business, and having traveled through Germany and England for the purpose of enlarging his knowledge, he settled in Holland. In 1720, he first conceived the idea of using quicksilver instead of spirits of wine in the construction of thermometers, by means of which the accuracy of the instrument was very much improved. See THERMOMETER. In 1724, F. was elected a fellow of the royal society of London; and the *Philosophical Transactions* of that year contain several papers by him on points in natural philosophy. He died in 1740.

FAIDHERBE, Louis Léon César, b. France, 1818. He began a military career in Algeria in 1844; was a captain in Guadeloupe in 1848; again in Algeria in 1851–52, and, in 1854, was made governor-general of the French possessions in Senegal. He largely extended the French territory, and greatly improved the government and property of the colony. To do this, he was compelled to wage a war of extermination against the prophet El-Hadji Omar, who had formed the project of driving out all foreigners and founding an immense Mohammedan empire in central Africa. The struggle ended in 1860, by the submission of the ambitious Omar. In the war with Germany, Faidherbe had chief command of the army of the north. In 1871, he was a member of the national assembly. He is the author of valuable works on African geography and antiquities.

FAIENCE, or Fayence, a general term for all sorts of glazed earthenware and porcelain. The origin of the name is disputed. Some derive it from Fayence, a small town of Provence; others from Faenza, a city of Italy; while certain writers consider that the isle of Majorca is at least the place where it was originally manufactured, in proof of which they appeal to the fact, that the Italians still call Faience *Majolica* or *Mayolina*.

FAI-FO, a seaport of Anam (q.v.) is one of the more considerable marts of the empire. It stands on a river near its mouth, communicating with Turon, 15 m. to the n., by means of a canal. It exports sugar and cinnamon, its principal trade being with China. It contains 15,000 inhabitants, who are mostly Buddhists.

FAILLON, Michel Étienne, 1799–1870; b. Paris; a writer on theology. He was a Sulpician, and visitor to the homes of that order in America. He wrote several valuable books, chiefly on Canadian history.

FAILLY, Pierre Louis Charles Achille de, b. France, 1810. He was in the army in Algeria in 1828; afterwards director of the military school at Toulouse. For services in the Crimean war, he was made gen. of division. In 1859, he was one of Louis Napoleon's aids, and was especially distinguished at Solferino. In the war with Germany, he commanded the 5th army corps. He was surprised and defeated at Beaumont, and his military career ended with the capitulation of Sedan.

FAINÉANTS ROIS (the "do-nothing kings"), the sarcastic designation of the later Merovingian sovereigns of France, under whose name the famous mayors of the palace really governed the country. The first of the do-nothing kings was Thierry III., nominally monarch of Burgundy, Neustria, and Austrasia; the others were Clovis III., Childebert III., Dagobert III., Chilpéric II., Thierry IV., and Childéric III. The last of these was dethroned in 730 A.D., and he being shut up in a monastery, Pepin *le Bref*, mayor of the palace, caused himself to be formally declared king. This was the end of the Merovingian dynasty; it is curious that Louis V., the last of the Carlovingians, and a descendant of Pepin *le Bref*, also received the contemptuous epithet of *Fainéant*, as those monarchs had who were dethroned by his ancestors.

FAINTING, or Syncope (Gr. *syn*, and *koptō*, I fall down), is a condition in which, from a sudden mental or bodily impression, the circulation of blood is temporarily arrested or very much diminished in force and volume, the respiration and the functions of the nervous system being likewise suspended. The indications of F. to a bystander are chiefly a sudden pallor, accompanied by loss of power over the limbs, with disappearance of the pulse and movements of respiration; the eyes are commonly half open or closed, the countenance bloodless, but quite at rest, and not indicative of suffering or disturbance: the flaccid, motionless condition of all the limbs also tends to distinguish simple F. from epilepsy, and the other diseases attended with spasm; whilst the vanishing of the color, and the suppression of the pulse, make a marked distinction between fainting and catalepsy (q.v.), and other forms of hysteria (q.v.); with which disorders, however, F. may in some cases be associated. The mode of origin of F., and the study of its phenomena, alike lead to the conclusion that it is primarily an impression upon the nervous system, very much of the same nature as the collapse, or shock of a severe bodily injury; this reacts, in the first instance, on the heart, and through the circulation on all the other functions of the body. F. may end in death, if too prolonged, or if associated with disease of the internal organs, and especially of the heart; hence a particular variety of F. has been separately studied, and named *syncope anginosa*, or otherwise *angina pectoris*. See Heart, Diseases of the. Ordinarily, a person who faints from mental emotion, a hot and close atmosphere, or other transient cause, is readily restored by being laid on the back with the head low, and surrounded by abundance of cool fresh air. Any tight articles of dress should be loosened, and a stream of cold air, or a little cold water, should be directed to the face and neck, so as to rouse the respiratory movements. It is common, also, to apply ammonia or aromatic vinegar to the nostrils; but a more effective way of exciting the respiration is to compress the ribs, and allow them to expand again alternately, so as to imitate the natural movement. Care should be taken to ascertain that there is no obstruction in the throat or air-passages, as suffocation from mechanical causes has been mistaken for F., and the real origin of the mischief overlooked, with fatal consequences. Should all other

means fail, galvanism (q.v.) will sometimes succeed in restoring the respiration and heart's action.

FAIOUM. See FAYUM.

FAIR. See FAIRS.

FAIRBAIRN, PATRICK, D.D., 1805–74; was b. at Greenlaw, Scotland; graduated at the university of Edinburgh; he was settled, in 1830, as pastor in one of the Orkney islands; was transferred to Bridgeton, near Glasgow, in 1837, and to Saltoun in 1840. For some years he was a professor at Aberdeen, and in 1856, was chosen principal and professor of theology and Greek exegesis in the Glasgow theological college of the free church. His most important writings are *Typology of Scripture*, highly esteemed as learned, judicious, and evangelical; *Prophecy; Hermeneutical Manual; Revelation of Law in Scripture; Commentaries on Ezekiel and the Pastoral Epistles;* a translation of Hengstenberg's commentary on the Revelation, and a portion of that on the Psalms.

FAIRBAIRN, Sir WILLIAM, Bart., was b. at Kelso, in Roxburgshire, in 1789. Having learned a little reading, writing, and arithmetic at the parish school of Mullochy, in Ross-shire, and afterwards got some six months' instruction from an uncle, he was apprenticed to an engine-wright at Percymain colliery, North Shields. When his apprenticeship terminated, F. wrought for two years in London, and then visited many places in England, Wales, and Ireland, working a short time at each, in order to observe the various practices of different localities. Eventually, he commenced business on his own account in Manchester in 1817. It was a struggle in which, without money or connections, only great abilities and perseverance would have succeeded. The first great improvement introduced by F. was the substitution of iron for wood in the shafting of cotton-mills, and the substitution of light for heavy shafting where metal was already in use. This exchange economized the cost of machinery, and enabled the motion to be speeded from 40 to 160 revolutions per minute. F. was amongst the earliest of the iron ship-builders, and has originated various improvements in their construction. The firm has built more than a hundred vessels, varying from the smallest size up to the war-frigate of 2,600 tons.

In 1834–35, F. and Mr. E. Hodgkinson were invited by the British association for the advancement of science to seek out the cause of certain supposed defects in the iron produced by hot-blast furnaces, and a very interesting report thereon appears in the *Transactions* of the association. Nearly at the same time, F. tested the strength of the various kinds of iron of Great Britain, the report of which appears in the *Transactions* of the philosophical society of Manchester, and contains much useful information for engineers. Another report, published in the *Transactions* of the royal society, gives the tenacity of boiler-plates of various thicknesses, and determines the best mode of riveting. He also made a long series of experiments on the resistance of hollow tubes or cylinders to collapse from outward pressure, leading to valuable practical results.

The first idea of a tubular bridge across the Menai strait is due to Robert Stephenson, but its realization is due to F. more than to all other men. Stephenson's idea was a circular tube, supported by chains; but the Britannia and Conway bridges are rectangular structures, strengthened by a series of cells at the top and bottom, and without chains or any other support from pier to pier. The present form results from a long series of experiments upon model tubes—circular, egg-shaped, and rectangular—which were conducted entirely for a long time by F., and latterly, with the aid of Mr. E. Hodgkinson, as a mathematician, to deduce a law from the tabulated results of experiments. F. erected more than a hundred bridges upon this principle. See TUBULAR BRIDGE. F. was a fellow of the royal society; corresponding member of the institute of France, and of the royal academy of Turin; LL.D. of Edinburgh; was president of the British association for the advancement of science, 1861–62; was a chevalier of the legion of honor; and was created a baronet in 1869. His son Thomas was chairman of the art treasures exhibition at Manchester, 1857; was a commissioner for the exhibitions or 1851 and 1862; was high-sheriff of Hampshire, 1870; and was, in 1857, offered the honor of knighthood, which he declined. F., amongst other works and papers, published: *On Canal Steam Navigation; The Strength and other Properties of Hot and Cold Blast Iron; The Strength of Iron at Different Temperatures; The Strength of Locomotive Boilers; The Effect of Repeated Meltings on the Strength of Cast Iron; The Irons of Great Britain; The Conway and Britannia Tubular Bridges; Useful Information for Engineers,* 1st, 2d, and 3d series; and *A Treatise on Mills and Mill-work.* He died in Aug., 1874. See *Life of Sir William Fairbairn, Bart.*, by W. Pole (London, 1877); and Smiles' *Lives of the Engineers.*

FAIRBANKS, ERASTUS, LL.D., 1792–1864; b. Mass. In 1825, with his brother, he established a manufactory for scales in St. Johnsbury, Vt. Their work has a world-wide reputation. In 1836–38, he was a member of the Vermont legislature, and in 1852–53 and 1860–61, he was governor of the state. In all business and social relations he was a man of spotless fidelity and integrity. He was a liberal giver to religious and charitable objects.

FAIRCHILD, JAMES H., D.D., b. Mass., 1817; entered Oberlin college in 1834; was tutor in 1838; professor of languages in 1842; of mathematics in 1847; of theology in

1858; became president in 1866, and (1880) retains that office. He is the author of a work on *Moral Philosophy*, and articles on the education of women.

FAIRFAX, a co. in n.e. Virginia, on the Potomac, intersected by the Virginia Midland and Great Southern, the Richmond, Fredericksburg, and Potomac, and the Washington and Ohio railroads; 430 sq.m.; pop. '70, 12,952—4,284 colored. The surface is hilly, with considerable woodland. Chief productions, wheat, corn, oats, and butter. Washington's residence, Mt. Vernon, on the Potomac, 15 m. below Washington, is in Fairfax co. Co. seat, Fairfax Court-house.

FAIRFAX, JOHN CONTEE, Lord, b. Md., 1830; succeeded to the title on the death of his brother, the tenth lord. He resided in Bladensburg, Md., having formerly practiced medicine in Woodburne, Md. The Fairfaxes are Scotch peers, without a seat in the house of lords.

FAIRFAX, EDWARD, the translator of Tasso's *Jerusalem Delivered*, was a natural son of sir Thomas Fairfax of Denton, in Yorkshire. The year of his birth is not known. He spent his life at Fuystone, in the forest of Knaresborough, in the enjoyment of many blessings which rarely befall poets—competence, ease, rural scenes, and an ample command of the means of study. F. was alive in 1631, but he is supposed to have died shortly after. His celebrated translation of Tasso was made in the reign of queen Elizabeth, to whom it is dedicated. The first edition bears the date of 1600. For poetical beauty and freedom, it has been the theme of universal praise. Dryden ranked F. with Spenser as a master of English, and Waller said that he derived from him the harmony of his numbers. F. also wrote a treatise on *Demonology*, in which he was a believer—a credulity which was probably of no little use to him in the translation of a work full of the machinery of enchantment. Hence Collins says regarding him—

> Prevailing poet, whose undoubting mind
> Believed the magic wonders which he sung.

This treatise is still in manuscript.

FAIRFAX, THOMAS, Lord, gen. of the parliamentary troops in England during the civil wars under Charles I., was the son of Ferdinand, lord F., and was b. in 1611, at Denton, in Yorkshire. He studied at St. John's college, Cambridge, and afterwards served as a volunteer in Holland, under lord Vere, whose fourth daughter, Anne, he married shortly after his return to England. On the outbreak of the civil war in 1642, F. warmly espoused the cause of the parliament, and was appointed cavalry-gen. under his father, who commanded the parliamentary forces in the north. He distinguished himself so much by his valor, prudence, and energy, that in 1645, when the earl of Essex resigned his office of gen. of the parliamentary forces, F. was appointed in his room. In a short time, Cromwell, who had been appointed lieut.gen., obtained unbounded influence over him; and from this time, although nominally head of the parliamentary forces, he really played a secondary part. At last, in June, 1650, he refused to march against the Scots, who had proclaimed Charles II. king, and Cromwell was appointed commander-in-chief in his stead. F. now withdrew into private life, and did not come forward again until after the death of Cromwell, when he showed a zeal for the restoration of the king, gathered troops for that purpose to assist gen. Monk against Lambert; and was appointed one of the delegates dispatched to the Hague in 1660 to promote the return of Charles II. He died at Bilburgh, near York, 12th Feb., 1671. F. had a slight turn for literary pursuits, and wrote several works, prose and poetic; among others, one entitled *Short Memorials*, which was published in 1699.

FAIRFAX, THOMAS, Lord, 1690–1782; born England; educated at Oxford, and known as writer for the *Spectator*. He came to Virginia in 1739 to look after the estate inherited from his mother, the daughter of lord Culpepper, governor of the province. He found nearly six million acres on both sides of the Blue ridge between the Potomac and Rappahannock. He employed George Washington (then but 16 years old) to survey the estate, and the intimacy then formed lasted through life, notwithstanding their radical differences in views of government. In the revolution Fairfax was on the side of England. It is said that the Yorktown surrender so wounded his national pride that it was the immediate cause of his death.

FAIRFIELD, the s.w. co. of Connecticut, bordering on New York and Long Island sound; intersected by the New York and New Haven, the Housatonic, and the Danbury and Norwalk railroads; 647 sq.m.; pop. '70, 95,276. The surface is moderately even, and the soil good, producing cereals, tobacco, butter, etc. Manufacturing is largely carried on, there being more than 800 separate establishments. Co. seats, Danbury and Bridgeport.

FAIRFIELD, a co. in central Ohio, traversed by the Cincinnati and Muskingum Valley, and the Columbus and Hocking Valley railroads, and the Ohio canal; 490 sq.m.; pop. '70, 31,138. Surface undulating, and soil fertile, producing corn, wheat, oats, hay, etc. Co. seat, Lancaster.

FAIRFIELD, a co. in central South Carolina, between Broad and Wateree rivers, crossed by the Charlotte, Columbia, and Augusta, and the Greenfield and Columbia

railroads; 625 sq.m.; pop. '70, 19,838—14,101 colored. The surface is uneven, and the soil fertile, producing corn and cotton. Co. seat, Winnsborough.

FAIRFIELD, a t. and port of entry in Fairfield co., Conn., on Long Island sound and the New York, New Haven, and Hartford railroad, 51 m. n.e. of New York; pop. '70, 5,645. A part of the town has recently been annexed to the city of Bridgeport. The town has a number of villages of importance besides Fairfield, and Southport is the business center. Manufactures are the chief occupation of the people. The village was burned by Gov. Tryon in 1779.

FAIRFIELD, a city and seat of justice of Jefferson co., Iowa, at the junction of the s.w. branch of the Chicago, Rock island, and Pacific, and the Burlington and Missouri river railroads; 50 m. w.n.w. of Burlington; pop. 2,343. It has two institutions of learning, Parsons (Presbyterian) college and Fairfield (Lutheran) college; a court house, schools, and manufactures.

FAIR HAVEN (former town in Conn.). See NEW HAVEN.

FAIR HAVEN, a village in Bristol co., Mass., at the mouth of Acushnet river, on Buzzard's bay, reached by a branch connecting with the Old Colony railroad one mile e. of New Bedford, and 54 m. s. of Boston; pop. of township '70, 2,768. A bridge connects Fairhaven with New Bedford. There are several manufactories in the village.

FAIR HAVENS, a harbor on the s. coast of the island of Crete, the port of Lasaea, about 5 m. e. of cape Matala, and immediately e. of a bold headland, on the summit of which are the ruins of an ancient convent dedicated to St. Paul. On the s. of the harbor are two small islands, and between these and the shore there is safe anchorage. The apostle Paul sailed from this port in Oct., 60 A.D., and was ship-wrecked on the island of Malta a few days afterwards.

FAIR or BENMORE **HEAD**, a promontory of the n. coast of Antrim, Ireland, opposite Rathlin isle, which is 4 m. to the n.w. It rises 636 ft. above the sea. The lower 300 ft. consists of carboniferous strata, overlaid by greenstone columns, 20 to 30 ft. thick, and rising 280 to 300 ft. high. It is perpendicular to the sea, but slopes to the land. The table-land on the top is covered with rich pasture, and presents fine views of the neighboring coast, Rathlin isle, and the Argyleshire highlands, 16 m. distant. On the promontory are two small lochs, 500 ft. above the sea.

FAIRIES—ELVES (Ger. *elbe*, or *elfe*; Sw. *elf*; Dan. *ellefolk*; Old Norse, *alfr*; all allied apparently to Lat. *alb*(us), white, and signifying a bright, benign spirit; Fr. *fée*; Ital. *fata*), supernatural beings, generally of diminutive size, a belief in whom has been among the superstitions of the greater portion of the European nations. The etymology of the word *fairy* is doubtful; some derive it and the Fr. *fée* from a Celtic word *'fuer*, to charm or bewitch; others associate the Fr. *fée* and the Ital. *fata* (a friendly goddess or spirit) with Lat. *fatum*, fate; others, again, trace *fairy* to the *peri* of the Persians (pronounced *feri* by the Arabians), holding it to have been brought to Europe by the crusaders. Be this as it may, the Celtic fees or fairies are undoubtedly relics of those *matres* and *matronæ*, which appear on Gallo-Roman inscriptions as objects of popular belief. After the transfusion of the Teutonic and southern nations, the northern elves (which were originally of two kinds—the light elves, or elves proper, and the dark elves, or dwarfs) became mixed up with their Celtic kindred the fairies in inextricable confusion.

It is generally difficult to give any scientific definition of the nature of a superstition, because its phenomena are continually varying according to time, place, and other conditions. The fairy superstition especially defies definition, because it was the peculiarity of the creatures to whom it referred that they followed no regular law, human or divine, but obeyed the impulse of their own caprice; hence every fairy tale differs from another. Still, there are distinctions and specialities that can be made out from the examination of a large number of these narratives. In the first place, the superstition peculiarly belongs to modern Europe. We find nothing like it among the idolatries of the heathen referred to in Scripture, nor does the word occur in the English Bible, or its equivalent in the original texts. In classical mythology, there is nothing nearer to it than the nymph of the fountain or grove among the Greeks. In the next place, it may be determined that the varieties in the superstition correspond, in some measure, with those of the physical geography of the districts in which it prevails. In those parts of the world where there are mountains, mists, dangerous morasses, cataracts, and stormy oceans, all superstitions, being a belief in supernatural agencies, are naturally exaggerated, and, from the dangers to which the people are liable from the agencies they deem supernatural, the belief takes deep root in their minds. Accordingly, in flat and well-cultivated countries like England, the fairy superstition is simple and homely, connecting itself with matters of domestic routine, such as the sweeping of the dwelling-house, the skimming of the milk, the preservation of the butter, and the like; while in Scandinavia and the Highlands the fairy people are connected with storms and convulsions, betray people to their death, fly away with them into the infinite cloud-land, or lead them through endless caverns within the earth. It has been observed, as a further distinction, that the fairies of the German or Teutonic tribes are more harsh, fierce, uncomely, or deformed than those of the Celtic nations, which have a tendency rather

to the aërial and the graceful. Still, there is so great an amount of common characteristic in the superstition throughout Europe, and its peculiarities have been found so much more emphatically displayed in Scandinavia than elsewhere, as to have suggested to some the view, that the superstition is a remnant of the old mythology of the northern nations, communicated by them to a greater or less extent in all the countries over which their vikings carried their ravages.

There is a further distinction—at least in this country—between the fairies of poetic and heroic literature and those of popular belief—the former being princes and princesses of chivalry, only distinguished from human beings by their superhuman superiority in all the qualities which elicited respect in the age of chivalry; while those of popular belief are small in stature, sometimes decrepit, and endowed with dispositions generally more allied to malignity than magnanimity. It is common to all classes of them to be deemed under the condemnation of the religion of the gospel, and to be either conditionally or unconditionally excluded from the abodes of the righteous in the next world. In Ireland and the Highlands, they have been spoken of as a wandering remnant of the fallen angels. It is sometimes a symptom of geniality and kindliness in a people when their fairies are supposed to be capable of earning their own redemption. Sometimes they are supposed to be human beings, metamorphosed or disembodied, and this form of the superstition has made fairyland a place of purgation for those whose sins have condemned them to it. The analogy is carried out in the belief that the services of the living can extricate the souls so situated; but it is rather through dexterity and courage than pure piety that the feat is achieved, and the rescues from fairyland form some of the most wild and exciting of the elfin narratives—as, for instance, the strange, wild ballad of *Tamlane*.

There is still another broad distinction into those that dwell in the upper air, and those that dwell within the bowels of the earth, while a third class frequent the waters. The surface of the earth on which mankind reside is not deemed the proper place of any class except on special occasions. The Scandinavians called the fairy inhabitants of the air white elves; those of the earth, black. Whatever was genial, light, playful, and benevolent in the superstition, clustered round the former; the latter did all the work that was dark, cruel, and rapacious. Naturally enough, the black or subterranean kind frequented mining districts, where they might be seen extracting the ore for themselves, and thus unwittingly leading the miner to rich veins of metal. They might be seen in an occasional peep through an aperture of a hill in their underground retreats, in chambers supported on jasper columns, where they were stowing away their hampers of gold and silver—for they were generally held to be very affluent. Some of the most exciting tales about the German gnome, and the Irish leprechaun, who was a creature of the same kind, are founded on the efforts of adventurous mortals to get possession of their riches. There exists a legend, occurring in nearly identical terms in several countries, which connects some piece of valuable plate belonging to a church with the underground fairies. The story of the horn of Oldenburg is a type of these narratives. The pictures of it represent it as a beautiful drinking vessel, in the shape of a horn, exquisitely decorated with the finest fanciful silver-work, in the style contemporary with the richest Gothic architecture. The legend is, that one day, Otho of Oldenburg, being exhausted with hunting, and very thirsty, exclaimed: "O God, would that I had a cool drink!" Thereupon there appeared before him, as if coming out of the rock, a lovely maiden, who offered him a drink in the fairy horn. He made off with it, and saved himself from evil consequences by bestowing it on the church. Hence these relics are generally in churches; but one of them is, or lately was, in the possession of an English family, and as their prosperity was traditionally believed to depend on retaining it, it was called "the luck of Eden hall."

Puck and the pixies belong to the same class of beings. Of the ell-folks of Scandinavia, the male is old and ill-favored, but the evil element in the ell-woman or ell-maid consists in her beauty, which enables her to be very dangerous to foolish young gentlemen, whom she waylays either by her own proper charms, or by personating the objects of their affections.

In Ireland, and also in the border country of Scotland, the fairy superstition has been the theme of innumerable poetic legends and mystic traditions. T. Crofton Croker, in his *Fairy Legends and Traditions of the South of Ireland*, 3 vols., 1828, presents a full and amusing account of the Irish fairies or elves, which he describes as "a few inches high, airy, and almost transparent in body; so delicate in their form that a dew-drop, when they chance to dance on it, trembles indeed, but never breaks. Both sexes are of extraordinary beauty, and mortal beings cannot be compared with them." They do not live alone, or in pairs, but always in large societies, and are governed by a queen. The same author adds: "They are invisible to man, particularly in the daytime, and as they can be present and hear what is said, the peasantry never speak of them but with caution and respect, terming them the good people, or friends. They have their dwellings in clefts of rocks, caves, and ancient tumuli. Every part within is decorated in the most splendid and magnificent manner; and the pleasing music which sometimes issues from thence in the night, has delighted those who have been so fortunate as hear it." There are Irish fairies, however, of more special character. Among these are the Banshee, or female spirit who watches a particular family; the

Cluricaune, an elf of evil disposition, who usually appears as a wrinkled old man, and has a knowledge of hidden treasure; and the Phooka, a spirit of diabolical disposition, who sometimes appearing as an eagle or a black horse, hurries the person he gets possession of to destruction. Of similar varieties are the Scottish elves: the Brownie, or domestic spirit nearly corresponding to the Banshee; the Kelpy, a kind of water-horse, being little different from the Phooka; and the Cluricaune being as regards figure somewhat analogous to the being sung by Leyden in his charming ballad, "The Cout of Keilder" (*Minstrelsy of the Scottish Border*):

"Brown dwarf, that o'er the muirland strays,
Thy name to Keeldar tell!"
"The brown man of the muirs, who stays
Beneath the heather-bell."

According to Irish as well as Scottish fairy superstition, the elves, though in the main harmless, or at most tricky, have the bad reputation of stealing away young children from the cradle, and substituting for them a changeling who bears a resemblance to the stolen infant, but is an ugly little creature, and never thrives. On this theft of a female infant, who is carried to Fairyland, but in the course of years returns to her parents, James Hogg founded his fine ballad of "Kilmeny" (*Queen's Wake*). It need hardly be added, that in the progress of general intelligence, the fairy superstition has disappeared in Scotland as well as the greater part of Ireland, and now is as little a matter of credence as is the belief in England of that useful drudging fiend, Robin Goodfellow. Besides being embalmed in imaginative literature, the fairy has a perpetual memorial in the small exquisitely shaped arrowheads found so abundantly in northern countries, where they were long known as elf-arrows, or bolts with which the more malignant fairies sometimes slew or injured cattle and human beings; thus, when a poor man's cow or heifer was suddenly affected with some deadly and incomprehensible illness, it was said to be "elf-shot." See ELF-ARROWHEADS.

For the most comprehensive account in the English language of the various shapes assumed by this superstition, the reader is referred to *The Fairy Mythology*, by Thomas Keightley.

FAIR ISLE, a solitary isle in the Atlantic, 25 m. s.s.w. of Shetland. It is 4 by 2½ m. in extent, and rises 708 ft. above the sea, with high rocky cliffs and promontories. It affords copper ores, and hand-shaped sponges called "trowie gloves." Pop. '71, 226, chiefly fishers. At Stromceiler creek, was wrecked, in 1588, the duke of Medina Sidonia, admiral of the Spanish armada. He escaped, after most of his crew were murdered. From the Spaniards, on this occasion, the natives of F. I. acquired a knowledge of the art of making woolen articles, such as caps, mittens, and stockings, in divers colors, the preparation of which is still a staple employment in the island for purposes of export.

FAIR OAKS, BATTLE OF. See CHICKAHOMINY.

FAIRS (*foire*, from Lat. *forum*, a market place, or *feriæ*, holidays), great periodical markets, some of which are chiefly devoted to one kind of merchandise, while others, of a wider scope, afford opportunity for most of the sales and purchases of a district. F. have long been regularly held in most parts of Europe and in many parts of Asia; but as they belong rather to a state of things which is passing away, than to modern civilization, they have not been established or have not acquired the same importance in America. In Europe, they appear to have originated in the church festivals, which were found to afford convenient opportunities for commercial transactions, the concourse of people being such as took place upon no other occasion. This origin of F. is commemorated in their German name *messen*, which is derived from the word employed to denote the most solemn part of the church service. See MASS. Some festivals, from circumstances of place and season, speedily acquired a much greater commercial importance than others, and began, therefore, to be frequented by buyers and sellers even from remote parts of the world. When the ordinary means of communication between countries and of the exchange of commodities were very limited, F. were of great use. Princes and the magistrates of free cities found it to their advantage to encourage them, and many privileges were granted to them, which in some places still subsist. Courts of summary jurisdiction—commonly called *pié poudre*, from the dusty feet of the suitors—were established distinct from the ordinary courts of the county or city, for the determination of questions which might arise during the fair. In connection with all this, the practice was necessarily adopted of publicly proclaiming the commencement and duration of the fair, and this still subsists where scarcely any other vestige remains of the old privileges of F., and where they have ceased to be of any real use to the community, and might, perhaps, with advantage to all the interests of society, be now abolished, as in the case of some of the annual F. still held in the great cities of Britain.

In western Europe, the goods exposed for sale at F. are chiefly those in respect of which there is a frequent change of fashion. Provisions are seldom an article of merchandise in them; and while in some parts of the continent persons of all ranks still wait for the great yearly F. to make their principal purchases of clothing and of manufactured articles of every description—such things as corn, wine, spirits, tea,

coffee, sugar, tobacco, oil, etc., are seldom seen in them. It is otherwise, however, in places on the outskirts of civilization; and almost all the produce of great provinces is sold, and all the inhabitants require is bought at such F. as those of Kiachta and Nishnij-Novgorod. The British F. really of much use at the present day are chiefly those at which cattle are exposed for sale; of these some held on the borders of the Scottish highlands, and elsewhere in Scotland, are frequented by buyers and sellers from all parts of the kingdom, and bring together the breeders of cattle and the graziers, by whom the animals are to be fed for the butcher. Such are the F., or trysts, as they are called, at Falkirk, Doune, Edinburgh, etc. At other great yearly F. in the south of Scotland, lambs and wool are sold; and F. chiefly for the sale of the annual produce of pastoral districts are common in almost all parts of the world.

The greatest F. in the world are the Easter and Michaelmas F. at Leipsic. These are not to be confounded with the Leipsic book-fair, which is chiefly an occasion for the settlement of accounts among booksellers and publishers. Next to the Leipsic F., those of Frankfurt-on-the-Maine are the most important in Germany. The F. of Frankfurt-on-the-Oder, and of Brunswick in Germany, of Zurzach in Switzerland, Pesth in Hungary, Sinigaglia and Bergamo in Italy, Beaucaire and Lyon in France, and Nijni-Novgorod (q.v.) in Russia, are among the most important in Europe. After the great F. of Leipsic, that called the fair of St. Peter and St. Paul at Nijni-Novgorod is the greatest in the world, and is frequented by buyers and sellers from different parts of Europe, and of northern and central Asia. The F. of Tanta in upper Egypt, of Kiachta in the south of Siberia, of Irbit, also in Siberia, of Mecca in Arabia, and of Hurdwar in western India, are also of very great importance, and are the most considerate F. out of Europe. That of Kiachta is a sort of barter-market, where almost all the commercial transactions between the Russian and Chinese empires take place. The F. in Britain have latterly sunk for the most part to insignificance, and in many instances have entirely disappeared. They were gatherings adapted to a comparatively backward state of society, when the provincial stores of goods were few, and the means of communication defective. The prevalence of good roads, populous towns with dealers in miscellaneous wares, and other tokens of advancement, have superseded the necessity for the ordinary class of F., and in consequence they have in some cases degenerated into scenes of merriment; such was Bartholomew fair, London, now extinct; also Greenwich fair, Glasgow fair, and Donnybrook fair, near Dublin; this last being likewise either extinct, or nearly so. The boisterous merriments at these F. were of old the devices employed as likely to attract a great concourse of people; hence each fair had its sport or drollery—football, wrestling, yawning, cudgel-playing, throwing at cocks, sack races, flying dragons, grinning through horse-collars, mock-giants, monstrous fishes, soaped pigs, smoking matches, eating hot hasty-pudding, whistling, wheel-barrow races. M. Bottin, the author of a statistical *View of the Fairs of France*, says that on examining his work it will appear that they were placed for the most part on the frontiers of the kingdom, or on the marches of ancient provinces; or at the foot of high mountains, at the beginning or end of the snow-season, which for months shuts up the inhabitants in their valleys; or in the neighborhood of famous cathedrals or churches frequented by flocks of pilgrims; or in the middle of rich pastures. A fair in the north of Scotland, held in June, when the nights are very short, began at sunset, and ended an hour after sunrise; it was called "sleepy market."

FAIRS (*ante.*) There are in the United States no fairs of the kind so common in the old world; but the term is applied to a variety of exhibitions, especially of cattle and agricultural products. In a wider sense it includes exhibitions and sales for charitable purposes, and indeed, almost any show where people are expected to bestow patronage and make purchases. During the war of the rebellion, what were called sanitary fairs were held in many cities of the northern states to raise funds for the U. S. sanitary commission, and their success was something entirely unprecedented. Some of the net results were as follows: The New York Metropolitan fair, $1,184,487.72; at Philadelphia, $1,035,398.96; Brooklyn and Long Island, $305,513.83; Boston, $50,000; Baltimore, $40.234.54, etc. The most universal fairs in this country are the annual cattle shows, which are held in more than half of the 3,500 counties in the union. The originator of agricultural fairs in the United States was Elkanah Watson, a prosperous merchant of Albany, N. Y. In 1819, the state legislature, mainly through his influence, appropriated $10,000 a year for six years for premiums on agricultural products and family manufactures. In 1832, the state agricultural society was incorporated. The county societies report to the state society, and that body reports to the legislature. A similar system prevails in many other states. Besides these regular agricultural fairs there are such exhibitions as the fairs of the American institute, of the Franklin institute, of the Maryland institute, and of many other organizations.

FAIRY RINGS are spots or circles in pastures, which are either more bare than the rest of the field, or more green and luxuriant. Frequently a bare ring appears, like a footpath, with green grass in the center, and the circle which the ring forms, or of which it might form a part, is often some yards in diameter. These rings began to attract the attention of men of science in the latter part of the last century, and various hypotheses were suggested to account for them. Some imagined that they might be the effect of

lightning. Dr. Withering appears to have been the first to ascribe them to the growth of fungi. Dr. Wollaston further investigated the subject, which has more recently been very fully investigated by prof. Way; and it is now perfectly ascertained and universally admitted, that F. R. result from the centrifugal development of certain kinds of fungi, especially of *Agaricus oreades*, *A. gambosus*, *A. coccineus*, and *A. personatus*. The common mushroom (*A. campestris*) shows a tendency to grow in the same manner. Probably the spot where the agaric has already grown is unfitted for its continued nourishment, and the *mycelium* (spawn) extends outwards to new soil, the fungus unfitting the soil to which it extends for the immediate nourishment of grass, but enriching it afterwards by its own decay. The *mycelium* of many fungi has certainly a tendency to extend outwards from a center; and decayed fungi, containing not a little of the phosphate of potash, are a highly stimulant manure for grasses. F. R. of large size sometimes occupy the same situation for many years. The circle is almost always imperfect, some accidental circumstance having arrested the growth of the mycelium on one side.

FAITH is used by theologians in various senses. It is sometimes taken to denote the mere assent of the understanding to a set of facts or of propositions set before it; it is more peculiarly used to express the living reception by the heart of the "truth as it is in Christ." Some divines have enumerated no fewer than four kinds of F.: 1. The F. of miracles, or that immediate persuasion of the almighty presence and power of their Master, which enabled the early Christians to work miracles—a persuasion, apparently, which might exist and issue in astonishing results without being associated with moral excellence. "Though I have all faith," says St. Paul, "so that I could remove mountains, and have not charity, I am nothing." 2. Historical F., or the assent of the understanding to truth the evidence of which is irresistible, such as we have described above. 3. Partial or temporary F., such as our Lord implies in his exposition of the parable of the sower, and as appeared to animate those who, after having followed after Christ, turned back and walked no more with him; and 4. Saving F., or the persuasion of Christian truth wrought in the heart by the Holy Spirit.

These distinctions are rather theological refinements than anything else; the proper and characteristic meaning of the term F. in Scripture has little to do with any of them except the last. "Faith," says the writer of the Epistle to the Hebrews, "is the substance of things hoped for, the evidence of things not seen." It is a vision, quality, or capacity of soul whereby spiritual truth is apprehended, and spiritual life engendered. The distant is brought near by it, and substantially appropriated; the unseen is felt to be a reality. F. is the organ by which the soul passes beyond the present and the visible to the eternal and the invisible. Still more characteristically, perhaps, F. is the living affection which binds the Christian to Christ *as a Savior*. "Faith is a saving grace whereby we receive and rest upon Christ alone for salvation, as he is freely offered to us in the gospel." This is its highest and most comprehensive meaning, out of which all the others come. "What shall I do to be saved?" asked the Philippian jailer of Paul. "Believe on the Lord Jesus Christ," he replied, "and thou shalt be saved." And it is remarkable how frequently it is Christ or God—a living person—rather than any mere truth or series of truths which is represented as the proper object of Christian faith. "Ye believe in God; believe also in me." "We believe in him that raised up Jesus our Lord from the dead." "Abraham believed God, and it was accounted to him for righteousness." "Come unto *me* all ye that labor and are heavy laden, and I will give you rest."

F., therefore, in this its highest view, is nothing but trust in God and in Christ. This is the F. which "worketh by love," and "overcometh the world"—the faith of which St. Paul and St. John alike speak. The F. mentioned by St. James in apparent conflict with works is different; it seems to have been a mere religious distinction. "Thou hast faith, and I have works." One party put forth F. as their religious badge—another works. The spiritual or true meaning of either the one or the other was little regarded.

F., in the distinctly Christian sense, can only exist by the operation of God's Holy Spirit. "For by grace are ye saved, through faith; and that not of yourselves; it is the gift of God." Orthodox divines greatly insist on the nesessity of this operation of the Spirit of God, yet not so as to exclude the active co-operation of man. The Pelagian and Antinomian extremes respectively throw out—the former the divine, the latter the human element. Orthodoxy combines the two, attributing to God the effective agency, but to man a real and voluntary concurrence. Some of the principal theological controversies connected with F., and not here already mentioned, will be noticed under JUSTIFICATION.

FAITH, ANALOGY OF. See ANALOGY, *ante*.

FAITHFULL, EMILY, b. England, 1835. She was early presented at court, and introduced to fashionable life in London, but became interested in improving the condition of working women. In 1860, she established a printing office in which women were employed as compositors, with great opposition, but with the approval of the queen. In 1863, she issued the *Victoria Magazine*, a monthly advocate of her work, and in 1868, *Change upon Change*, a novel. She also delivered public lectures on the employments of women, lecturing in 1872–73 in the United States. In 1877, she began the

publication of the *West London Express*, the type-setting being wholly by women. The success of this publication has led to the employment of large numbers of women, and the introduction of steam machinery into the office.

FAITHORNE, WILLIAM, a very eminent English engraver, was b. in London in the early part of the 17th c., but the exact date is not known. He was a pupil of Mr. (afterwards sir Robert) Peake, printer and printseller. On the outbreak of the civil war, he followed his master, who had taken up arms for king Charles. Both were taken prisoners at Basing-house. F. was sent to London, and imprisoned in Aldersgate, but after some time was released, and obtained permission to leave the country. He went to France, where he increased his proficiency in the art of engraving, and returning to England about 1650, commenced business as a printseller near Temple Bar. He also engraved steadily for the booksellers at the same time. About 1680, he gave up his shop, but still prosecuted his art, besides executing portraits in crayon, and painting in miniature. He died in May, 1691. F.'s engravings are for the most part portraits. Walpole has given a pretty full list of them, a few of which we may mention, such as the portraits of "Thomas Hobbes," ætat 76; "Henrietta Maria;" "Cromwell;" "Prince Rupert;" "Sir Thomas Fairfax;" and "John Milton," ætat 62. At first F. imitated the Dutch and Flemish manner of engraving; but his residence in France appears to have considerably modified his earlier style. F. is also an author, having published in 1662 a treatise on engraving, dedicated to his old master, and entitled *The Art of Graveing and Etching, wherein is expressed the true Way of Graveing in Copper; also, the manner and Method of that famous Callot and M. Borse in their several Ways of Etching.*

FAITH, RULE OF, is that which determines what man is to believe concerning his origin, duty, and destiny. I. Many persons, denying either the possibility or the fact of a supernatural revelation, maintain that human reason alone, as possessed by all persons of sound mind, is both the source and ground of all religious knowledge and conviction of duty. II. Others, either denying or depreciating the authority of any external revelation, affirm that every man, in connection with his reason, yet as the enlightener of it, has an inward revelation—God with him—to which pertains the supreme authority in the belief of truth and knowledge of duty. III. The Roman Catholic church, admitting that truth supernaturally revealed is the rule of faith, teaches that the revelation actually given is partly written (as contained in the Old and New Testaments and the Apocrypha) and partly unwritten (as treasured up in divine and apostolic traditions); and that, consequently, the rule of faith includes both Scripture and tradition. And, as the people cannot surely and perfectly understand either of these, the only authorized interpreter of them both is the church, the infallibility of which is vested in the pope. Thus, ultimately, for every Roman Catholic, the rule of faith is the teaching of the infallible pope of Rome; and this, practically, for the mass of the people, resolves itself into the dictum of the parish priest, from whom they are bound to receive whatever he tells them as the judgment of the pope. IV. Protestants believe that all extant revealed truth is contained in the canonical Scriptures of the Old and New Testaments; and therefore teach that these (received by every man, after due inquiry, as the word of God, and interpreted according to his own judgment, enlightened through the use of all accessible helps, human and divine) constitute for him the rule of faith. Among those holding this general principle of Protestantism there are recognized diversities, according as, on the one hand, the authority of the Bible —even in its letter—is intensified, or, on the other hand, the sphere of human reason in interpretation of its spirit is enlarged. Also to the *consensus* of the church are assigned differing degrees of authority in the interpretation of Scripture among different sections of Protestants

FAIZÁBÁD, a division in British India comprising the districts of Faizábád, Gonḍá, and Bharaich; 7,671 sq.m.; pop. '68, 3,379,262, of whom 3,028,502 were Hindus.

FAIZÁBÁD, a district in Oude, British India, between the Gogra and Gumti rivers; 1649 sq.m.; pop. 1,024,092. Ajodhya, the capital of the ancient kingdom of Oude, so conspicuous in the Sanscrit epics, is in this district. In more modern times the district was the center of the nawab vizier's influence, and contained his capital until the removal of his court to Lucknow in 1775. The district is intersected by the Oude and Rohilcund railroad, and has important trade in rice, wheat, sugar, indigo, opium, etc.

FAIZÁBÁD, a city, the administrative headquarters in the district of the same name, on the Gogra river, India. A suburb of the city is the old Ajodhyá, the ancient capital of king Daswratha, the father of Ráma, the hero of Rámáyaná. Of this ancient city, said to have covered a large area, scarcely a trace remains. The city of Faizábád was founded about 1730 by Alí Khán, the first nawab of Oude, who made it his capital. The place rapidly grew in importance until 1775, when the court of Oude was removed to Lucknow. It then rapidly decayed, all the leading merchants, bankers, etc., abandoning the place. In 1839, Butter estimated its pop. at 100,000, but fast diminishing, owing to the exactions and oppressions by the native officials of the nawáb's government. At the time of the census in 1869, Faizábád contained only 37,804 inhabitants; but it is now again advancing in prosperity, and is rapidly becoming an emporium of trade. At the time of the annexation of Oude in 1856, Faizábád was made, and still continues to be, a large military station. On the outbreak of the mutiny in 1857, the cantonment

contained two regiments of infantry, a squadron of cavalry, and a light field battery of artillery—all natives. Owing to their threatening demeanor after the Meerut massacre, many of the European ladies and children were sheltered by one of the great landholders of Oude, and others were sent forward to less disturbed parts of the country. The troops rose, as was anticipated, and although they at first permitted their officers to take boats and proceed towards Dinapur, a message was afterwards sent to a rebel force lower down the river to intercept the fugitives. Of four boats, one succeeded in reaching Dinapur safely, having passed the rebels unnoticed. Of the occupants of the other three boats, one person alone escaped. Faizábád is now a station for European as well as native troops.—[Condensed from *Encyclopædia Britannica*, 9th ed.]

FAKIR', a word derived from the Arabic *fakhar* (poor), and designating a member of an order of mendicants or penitents, chiefly in India and the neighboring countries. In Persia and Turkey, the word is also used for Moslem priests and dervishes (see DERVISH). The origin of fakirism, an institution which reaches back to the most remote antiquity, is lost in mythical darkness. The common account of the son of a mighty rajah, who, expelled from his home and country by the cruelty of his father, made a vow, half in revenge, and half in contrition, henceforth to roam a beggar through the world, and to win proselytes to a life of poverty and self-mortification, as the one most befitting in man, and most pleasing to the Deity, can hardly be called historical. The same yearning for rest, for peace, and pious contemplation, for escape from the noise and turbulence of the world, which has everywhere and always led still and pensive minds into seclusion and solitude, must naturally have been more powerful here, in a land which yielded almost of itself, and in abundance, all that was necessary for the sustenance of man—in a climate of flower and sunshine, where a hermit's calm retreat might well rise before the wearied eye in all the soft sunset hues which surround the abode of the recluse in the Ramayana, or in the Sakoontala. But constant seclusion and ceaseless meditation here, as elsewhere, produced in all but exceptional minds their sad results. Piety is no longer enough; sanctity is the goal. Thus, abstinence becomes mortification and self-torture; mental repose, mystic self-absorption, or frenzied exaltation. This leaning of the Hindus to a life of asceticism was fostered by their primeval religion, which enjoins various exercises of penance and mortification upon the three higher castes in general, but upon the Brahmins in particular. These, having passed through different stages of regeneration, end by becoming Sanyassis ("who have left everything"), and are dead to the law. The world and its usages have no more any claim upon them; even religious ceremonies are no longer necessary to the "united with God." They go naked, or in filthy rags, receive the meanest food only, and that without either demand or thanks. Their ethical code consists in the observance of truth, chastity, internal purity, constant repentance, and contemplation of Deity. After these models fakirism seems chiefly to have been framed, and its adherents were not only pious men, but occasionally saints, workers of miracles, and healers of all ills, especially epilepsy and sterility. The halo which from the first surrounded fakirism, and the ready worship offered by the people, attracted to its ranks, at a very early date, many whose motives were anything but pure, and who, under a garb of humility and mendicity, collected fabulous treasures. Strabo already distinguishes these vagabonds from the more honest members of their class, and if we may trust the travelers of our own day, the more respectable element has now altogether disappeared. Their number is variously stated. In the time of Tavernier's visit, there were more than 1,200,000 Hindu, and 800,000 Mohammedan fakirs in the East Indies, and their present number is said to exceed 3,000,000. Papi describes the Mohammedans as guilty of the greater follies. At times, especially in their return from distant pilgrimages, they are even dangerous, as the killing of an unbeliever is supposed to be an infallible introduction to the glories of paradise. They live either separately as hermits or solitary mendicants, or unite in large gangs, carrying arms and a banner, beating drums, and sounding horns as they approach a town or village. Their appearance is disgusting in the extreme; they go naked, besmeared with the dung of the holy animal, the cow. Some bedeck themselves with the skins of serpents, some with human bones; others array themselves in the garb of women. Their fearful shrieks, and the hideous rollings of their eyes, add to the disgust of their appearance. Imitating madmen, they generally end by becoming madmen. The height to which self-torture is frequently carried by these wretched fanatics, and of which we meet with signs even so far back as the Ramayana, where a penitent is described as perpetually sitting with upraised arms between four fires, the sun forming the fifth, is so appalling that human nature shrinks from the mere description. Some pass their whole lives in iron cages, laden with heavy chains; some clinch their fists till their nails grow through the hand; others hold aloft both their arms till they become like withered branches; while others, again, tie their hands and feet together, and roll head over heels for thousands of miles. Not the least sad feature in all this is, that these religious antics are not confined to men, but that youths, and even children of tender age, are occasionally initiated therein.

FALABA, a t. in w. Africa, 190 m. n.w. of Freetown, in Sierra Leone, on the Fala river. It was founded by the Sulimas who revolted from the Mohammedan Foulas, and its warlike inhabitants soon attained supremacy over the neighboring villages and country. The town consists of 4,000 to 5,000 small huts arranged in clusters around

squares or court-yards; and although built of clay, they are neat and in some instances even elegant.

FALAISE, a t. of France, in the department of Calvados, is situated on a lofty plat form bordering on a precipice, or *falaise*, whence its name. It is situated on the Anté, a feeder of the Dive, 22 m. s.s.e. of Caen. It has three suburbs, one of them, Guibray, a mile to the e., rivals the town itself in size and population. The buildings of interest are the ecclesiastical edifices, the hospital, the public library, and, more than all, the old and ruined castle, once the seat of the dukes of Normandy, and the birthplace of William the conqueror. In the castle, the chamber in which the conqueror was born is still shown, as well as a tower called "Talbot's" tower, which is supposed to have been built by Talbot when lord warden of the district, after the capture of F. by Henry V. of England. F. has manufactures of cottons, hosiery, and bobbin-net. At Guibray, an important annual fair is held, at which great numbers of horses and cattle are sold. It takes place between the 10th and 25th of August. Pop. '76, 8,120.

FAL'ASHAS (i.e., Exiles), the degenerate Jews of Abyssinia, found in considerable numbers in the provinces w. of Takazze. It is doubtful whether they are to be ethnologically identified with the seed of Abraham, or regarded, like the Khazars of the 8th c., as, for the most part, mere proselytes to Judaism. As to the date when the race or the religion was introduced there is no authentic information, one account carrying it back to the days of Solomon and his hypothetical son Menelek by the queen of Sheba, another to the time of the Babylonian captivity, and a third only to the 1st c. of the Christian era. That one or the other of the earlier dates is probably correct may be gathered from the fact that the Falashas know nothing of either the Babylonian or Jerusalem Talmud, make no use of the tephilin, and observe neither the feast of Purim nor the dedication of the temple. They possess—not in Hebrew, of which they are altogether ignorant, but in Ethiopic (or Geez)—the canonical and apocryphal books of the Old Testament; a volume of extracts from the Pentateuch, with comments, given as they think from God to Moses on Mount Sinai; the Te-e-sa-sa Sanbat, or laws of the Sabbath; the Ardit, a book of secrets revealed to twelve saints, which is used as a charm against disease; lives of Abraham, Moses, etc.; and a translation of Josephus called Sana Aihud. A copy of the Orit or Mosaic law is kept in the holy of holies in every mesgeed or synagogue. Various pagan observances are mingled in their ritual; every newly-built house is considered uninhabitable till the blood of a sheep or fowl has been spilt in it; a woman guilty of a breach of chastity has to undergo purification by leaping into a flaming fire; the Sabbath has been deified, and, as the goddess Sanbat, receives adoration and sacrifice, and is said to have ten thousand times ten thousand angels to wait on her commands. There is a monastic system, introduced it is said in the 4th c. by Aba Zebra, a pious man who retired from the world and lived in the cave of Hoharewa, in the province of Armatshoho. The monks must prepare all their food with their own hands, and no lay person, male or female, may enter their houses. Celibacy is not practiced by the priests, but they are not allowed to marry a second time, and no one is admitted into the order who has eaten with a Christian, or is the son or grandson of a man thus contaminated. Belief in the evil eye or shadow is universal, and spirit-raisers, soothsayers, and rain-doctors are in repute. Education is in the hands of the monks and priests, and is given only to boys. Fasts, obligatory on all above seven years of age, are held on every Monday and Thursday, on every new moon, and at the Passover (the 21st or 22d of April). The annual festivals are the passover, the harvest feast, the Baala Mazâlat or feast of the tabernacles (during which, however, no booths are built), the day of covenant or assembly, and Abraham's day. It is believed that after death the soul remains in a place of darkness till the third day, when the first taskar or sacrifice for the dead is offered; prayers are read in the mesgeed for the repose of the departed, and for seven days a formal lament takes place every morning in his house. No coffins are used, and a stone vault is built over the corpse so that it may not come into direct contact with the earth. The Falashas are an industrious people, living for the most part in their own villages, or, if they settle in a Christian or Mohammedan town, occupying a separate quarter. They engage in agriculture, manufacture pottery, ironware, and cloth, and are especially sought after for their skill in mason-work. Their numbers are variously estimated at from 80,000 to 200 000. [Largely from *Encyclopædia Britannica*, ninth edition.]

FALCHION. See SWORD.

FALCIDIAN LAW, so called because proposed by a Roman tribune named Falcidius. It was enacted in the time of Augustus, 37 years before the Christian era, and provided that testators could dispose of only three fourths of their property by will, and that the remaining one fourth should go to the heir. The common law imposes no such restriction, but allows a testator to dispose of his whole estate among strangers, leaving his family unprovided for. In some of the American states there are laws restricting the power of the testator in making bequests to charitable institutions. In New York one half only of a man's property, after the payment of his debts, can go to charitable uses, if a wife, child, or parent survive.

FALCON, *Falco,* in the Linnæn zoology, a genus of birds, including all the diurnal birds of prey, now known as the family of *falconidæ;* but in its present use as a generic name, limited to nearer accordance with its popular use, as a designation of those species which, in the language of falconry, were styled *noble birds of prey.* The true falcons are characterized by a bill curved from the base, the upper mandible hooked at the point, and the cutting edge of the upper mandible furnished with a strong projecting notch, or *tooth.* The claws are also sharp, curved, and strong; and in accordance with all this powerful armature, the whole frame is very robust and muscular. The legs are rather short, and have great power in striking or seizing prey. The keel of the sternum (breast-bone) is very large, and adapted for the attachment of powerful muscles; the furcula and coracoid bones (see BIRDS) are also very strong, so as to afford a sufficient resisting base for very powerful action of the wings. The wings are long and pointed, the first and third quill-feathers of equal length, the second rather the longest, the first and second quill-feathers emarginated near the tip. The true falcons are bolder in proportion to their size than any other falconidæ—even eagles. Their acuteness of vision is wonderful; and they have very great powers of flight. A F. is known to have traversed the distance between Fontainebleau and Malta, not less than 1350 m., in 24 hours. The speed attained by a F. in pursuit of its prey has been calculated to be at the rate of 150 m. an hour. They soar to a prodigious height in the air, always endeavoring to outsoar any bird of which they may be in pursuit, and to swoop down upon it from above; although it is far more difficult for them to rise vertically in a calm atmosphere than for birds of short and rounded wing, and they either rise obliquely—often also making their onward flight in a series of arcs—or avail themselves of the wind, and by flying against it, are borne aloft as a boy's kite is. The species are pretty numerous; some of them are of very wide geographic distribution, whilst others are peculiar to certain countries or climates. The British species are the gyrfalcon (q.v.), or jerfalcon (*F. gyrfalco*), also known—although, perhaps, with difference of variety—as the Iceland F. and Greenland F.; the peregrine F. (q.v.) (*F. peregrinus*), of which the female is *par excellence* the F. of falconers (see FALCONRY), and the male is the tercel, tiercel, or tercelet; the hobby (q.v.) (*F. subbuteo*); the red-footed F., or red-legged F. (*F. rufipes*), a small species, much resembling the hobby; the merlin (q.v.), (*F. æsalon*); and the kestrel (q.v.), or windhover (*F. tinnunculus*). For the species chiefly used in falconry, see FALCONRY.

Very closely allied to the true falcons are the species constituting the genus *hierax,* very small, but remarkable for strength and courage, natives of the East Indies. The upper mandible has two notches. In the *harpagons* (*harpagus* or *bidens*) of South America, both mandibles have two notches. None of these, however, are equal to the true falcons in length of wing.

For particulars regarding the falconidæ, as subservient to field-sports, see FALCONRY.

FALCO'NE, ANCILLO, an eminent Italian battle-painter, b. at Naples in 1600. A fellow-student of Salvator Rosa's at Spagnoletto's studio, he himself subsequently became the founder of an academy of much resort. In accordance with his turbulent impulsive nature, he flung himself into the political struggles of the times, and during Masaniello's outbreak, organized his numerous scholars and dependants into a secret band, which inflicted deadly retaliation on the Spaniards. On the suppression of the insurrection, F. fled to France, but subsequently returned to Naples, where he died in 1663. The works of this painter, representing chiefly military scenes, are few in number, and costly in price; they are prized for their extreme fidelity to nature, as much as for their harmony and brilliancy of color, and their variety of expression.

FALCONER, HUGH, 1808-65; b. Scotland; botanist and paleontologist; graduated at Aberdeen, and in medicine from Edinburgh university. He went to India as assistant surgeon, where he became deeply interested in paleontology and geology. On his recommendation the culture of the tea plant was undertaken in India. In 1848, he was professor of botany in the Calcutta medical college. He was a member of many learned societies.

FALCONER, WILLIAM, was b. in Edinburgh in 1732, and was one of a family of whom all, excepting himself, were deaf and dumb. He went early to sea, serving his apprenticeship on board a merchantman; and before he was 18 years of age he was second mate, in a vessel in the Levant trade, which was shipwrecked off cape Colonna, himself and two others being the only portion of the crew saved. He published *The Shipwreck* in 1762, and during the next year he entered the navy as midshipman in the *Royal George.* When peace came, he resided in London, where he wrote a satire on Wilkes, and compiled a *Nautical Dictionary.* He proceeded to sea in Sept., 1769, as purser in the *Aurora* frigate; reached the cape of Good Hope in Dec.; and perished with his companions—the *Aurora* having gone down—in the Mozambique channel.

F. wrote several poems, but *The Shipwreck* is the one on which his fame rests. It abounds in nautical language, and has the rare merit of being interesting. It is not a great poem, but it has always had its readers and admirers. In the second edition, the author added the characters of Albert, Rodmond, Palemon, and Anna—characters bearing the same relation to actual sailors that Alexis and Chloe bear to actual shepherds and shepherdesses—and to some extent destroyed that singleness of impression which was the chief merit of his work.

FALCONET, a name used in the 15th and 16th centuries for the smallest class of cannon. The ball weighed from 1 lb. to 3 lbs., and the gun from 5 cwt. to 15 cwt.

FALCONI'DÆ, a family of diurnal birds of prey (see ACCIPITRES), corresponding with the Linnæan genus *falco*, and exhibiting those characters of muscular vigor, armature of beak and talons, and power of flight, which are to be found in their highest perfection in the true falcons (q.v.), and in a scarcely inferior degree in the eagles (q.v.). The species are numerous; the British museum alone contains specimens of almost 200 unquestionably distinct species; but very many supposed species have been named and described by ornithologists, which, in the progress of science, have been ascertained to owe their distinctive characters merely to age and sex. The female is generally larger than the male; and the plumage of the young different from that of the adult. There are, in the different groups, considerable diversities in the curvature and strength of the bill, which also has the cutting edges of the mandibles either notched, festooned, or plain; the legs and toes also exhibit diversities as to length, strength, feathering, etc.; and in some groups, the wings are much longer, and at the same time more pointed, than in others. This is particularly the case with the true falcons, as contrasted with eagles, hawks, buzzards, kites, harriers, etc., and, in the language of falconry, the former—having the second quill-feather longest, and the first nearly equal to it—are called *noble birds of prey* (see FALCONRY), being those usually domesticated and trained for the service of man; the latter—having the fourth quill-feather longest, and the first very short—are called *ignoble birds of prey*, even eagles receiving this designation. The F. are distributed over all parts of the world; and almost all kinds of vertebrate animals, except the largest quadrupeds, are the prey of some of them. Some also devour insects. Like the *felidæ* among ravenous quadrupeds, the F. do not willingly feed on carrion, but generally seize and kill their own prey. As in the *felidæ*, also, there is a provision for the preservation of the claws from being blunted by unnecessary contact with the ground, or with any hard substance, the F. contracting the toes so as to elevate their claws. The F. generally live in pairs.

The lämmergeier (q.v.) connects this family with the vultures; the secretary (q.v.), whilst in many respects agreeing with the F., is peculiar in some of its characters.

FALCONRY, the term applied to the art of training certain of the falcon tribes to the pursuit and capture, on the wing, of birds such as the heron, partridge, lark, rook, magpie, wild duck, pigeon, etc. In ancient times, this sport was called HAWKING, a term still preserved in many places, and which, perhaps, is the more strictly correct of the two. Nowadays, *falconry* is the term applied to the sport and all that pertains to it; *hawking* to its actual practice in the the field. F. is of very ancient origin, and has been traced back, as an eastern sport, to a period anterior to the Christian era. In Britain, it seems to have been followed before the time of the heptarchy; and in the celebrated Bayeux tapestry, Harold is figured with a hawk upon his hand. It seems, however, to have been practiced in eastern countries, and in central Europe, long before it became established in Great Britain; and to such a height did the sport reach in Germany, that nobles, and even kings, seem to have devoted to it the greater part of their time. As an instance of this, the emperor Frederick II. of Germany was a passionate admirer of the sport, and is said to have written a treatise on F., published by J. G. Schneider in 1788 (3 vols. Leip.). In England, after the Norman conquest, F. seems to have taken rapid strides, being much indulged in by kings, nobles, and ladies; and in those days the rank of the individual was indicated by the particular species of hawk carried on his wrist. Thus, an earl carried a peregrine falcon. In the 17th c., the sport declined; in the 18th c., it partially revived, but again fell off about the year 1725, when the art of shooting birds on the wing came into fashion. In the present day, an attempt is being made in several quarters in England to restore this noble sport, and already its restoration is being attended with growing success. In India, Persia, and other eastern countries, F. is still eagerly practiced, the methods there followed being for the most part nearly similar to those of Great Britain.

In F., two distinct kinds of hawks are used—the long-winged or true falcons, and short-winged. The first (noble birds of prey) are represented chiefly by the gyrfalcon and peregrine; the second by the goshawk and sparrow-hawk; and though for certain purposes the male is superior, as a rule the *females* of each species are much more highly esteemed for sporting purposes, from their being larger and more powerful. "Long-winged" hawks may also, as a rule, be distinguished from the "short-winged," by their having a "tooth" or notch on the upper mandible; from the second feather of the wing being either longer, or as long, as the third; and from their impetuous "stoop" at their prey.

The gyrfalcon (q.v.) is the largest species, but from its extreme rarity in the British islands, is seldom used. The peregrine falcon is the bird in greatest favor with falconers, and if taken from the nest, as is usually the case, and carefully trained, affords better sport than any other British species. We shall therefore confine our remarks, for the most part, to the sport as it is practiced with this bird.

No hawk is fit for sporting purposes until it has undergone a careful process of training. The young hawk is more easily trained than that which has been caught in a wild state, but in either case, a number of operations require to be gone through before the

sportsman ventures to take his falcon into the field. Taken from her nest on some high and dangerous cliff when nearly fledged, the *eyess*, or young falcon (with her companion-fledglings, usually two in number), is carefully conveyed to the falconer's home: there she is kept in an open shed in a nest of straw, and fed several times a day upon fresh beef, with an occasional change of birds or rabbits. At this somewhat critical period, she should never be handled, except to put on the *jesses* and *bells*, which afterwards becomes permanent fixtures. Her powers of flight, too, being as yet very limited, she depends upon her master for regular supplies of food, and soon learns to come for her meals at his call. Her meat is usually fixed to an apparatus termed the *lure*, and thus the hawk is early accustomed to that important instrument, the further uses of which are explained below. By degrees her powers of flight are strengthened, and she is permitted to fly at large (returning to the lure at her master's will to be fed, or in hawking language, to remain *at hack*) for several weeks, during which time her meals are gradually reduced to one a day. While at hack, she sometimes becomes wild, wanders far from home, and kills game for herself; and when this is the case, she is usually caught by enticing her to a bow-net, close to which a pigeon or some meat is fastened to the ground. After being "taken up" from hack, she is kept at the *block*—the stand upon which she sits—for a few days before her regular training begins. At this time, also, hawks require a bath twice or thrice a week.

The first of the principal operations in training is *hooding*, an operation which, if successfully performed by the trainer during his earlier efforts, paves the way for overcoming many subsequent difficulties. It demands the greatest patience and the tenderest manipulation. The hood is a cap of leather, made to fit the head of the falcon in such a manner as totally to obscure the light, a single aperture only being left, through which the beak protrudes, and a slit behind, through which are passed the braces or ties that secure the hood to the head. By shutting out the light, the hood is serviceable in tending to make the hawk quiet and tractable, but to accustom the falcon to submit to its use requires much time and great management. When, after great perseverance, this is achieved, the hawk is said to be "*made to the hood*," during which process she also learns to sit balanced upon the fist. Besides tending to induce docility by hiding the light, the hood is of further service in shutting out from view any object which might cause the hawk to flutter or *bait* off the fist or *cadge* on its way to and from the field, etc. Hence the hawk is carried always hooded—the short-winged only being exempt. To the falcon's legs are attached two small hollow globes of thin metal, called *bells;* these, again, are fixed to their place by leather straps called *bewits;* and both, together with the jesses, become permanent fixtures even during the bird's flights. *Jesses* are two leathern straps, 5 or 6 in. in length, attached to each leg immediately below the bells; the jesses, again, are themselves attached to another leathern strap, called the *leash*, about four times the thickness of a boot-lace, by two rings or *varvels;* and the bird being thus caparisoned, the falconer winds the leash through his fingers, and so prevents the falcon's escape while on his wrist. Instead of varvels, some falconers follow the Dutch plan of using a swivel: the former method, however, is now considered the best. A long cord, called the *creance*, is further attached to the leash, and is used for the purpose of giving the bird greater freedom during her training than that afforded by the leash alone.

The *lure* is a bunch of feathers attached to a cord and tassel, and in the center of the feathers is usually a piece of spliced wood, to which a piece of meat may be attached. By accustoming the hawk to feed off the lure, or to come to it at a certain call or whistle to be fed when on the wing, the lure becomes an important adjunct to the falconer's apparatus, as by it he is enabled to entice his bird back after an unsuccessful chase. On such occasions, the falconer reclaims his bird by swinging the baited lure round and round his head, accompanying the action by some well-known call. Four wings tied together make a good lure. The *tabur stycke* and *drawer* were formerly used for the same purpose as the lure, but were made in the form of a stick.

In Europe, hawks are carried on the left wrist (while in the east they sit upon the right); and to protect the falconer's hand from being injured by the bird's claws, a glove of stout buckskin leather is used. And here it may be remarked, that the claws and beak of wild caught or *haggard* falcons, are usually pared or *coped*. If the bird to be trained, instead of being a nestling, happens to be a wild one, the difficulties of training are immeasurably increased, and can only be overcome by days and nights of unwearying exertion. If it proves unusually restless and difficult to tame, it is kept on low diet, is prevented from sleeping for several days and nights, and has cold water poured upon it by means of a sponge, etc. By these and other means, the falcon gradually loses much of its restiveness, and submits with tolerable readiness to the processes of training.

For training the *eyess*, or young falcon, to the lure, as preparatory to entering at game, sir John Sebright says: "Take the hawk out while very hungry, and let an assistant swing the lure round his head steadily, and at full length of the cord; upon this the falconer casts off his hawk with the usual whistle or halloo, still holding the *creance*, and the assistant suffers the lure to fall to the ground, for fear of injury to the hawk, by striking it in the air with the two strings attached. When this lesson is perfect, the assistant, instead of suffering the lure to fall, withdraws it, and disappoints the hawk, which flies by him, and then returns, when he may be suffered to strike the lure and

feed upon it. In process of time, the creance may be removed, and the hawk enticed to the lure from a considerable distance, and may then strike it in the air (if the lure is a light one), while swinging round the head of the assistant. After a still greater time, the hawk becomes so perfect that she will circle round the head of the falconer, waiting for the lure to be thrown, and is then said to '*wait on*' perfectly. When the hawk is feeding on the lure, the falconer should encourage her, and suffer her to finish without alarm, by which she will be shown that she may do so without fear, and will readily suffer herself to be taken after flying. She should also be accustomed to horses, men, and dogs."

Having "made the hawk" to *the fist, the hood,* and *the lure,* she is next "entered" at her game (the *quarry*). This is done by tying a long cord or *creance* to the varvels of the jesses, and flying the hawk from the hand at a bird thrown out to it, also restrained by a cord. The hawk is next flown several times without a creance at birds *shortened in their flight,* after which it is ready to be entered at wild quarry. In case of failure, however, a live bird, similar to that at which she is flown, should be carried to the field, and thrown out to her in a creance by way of encouragement.

The heron is, and always has been, a favorite object of pursuit in British F., the period of the year best adapted for the sport being the breeding season. Having previously ascertained the feeding-place of that bird, the hawking party makes for the spot, usually towards evening, if possible in a direction *down-wind* from the heronry, so as to intercept the bird in its *up-wind* flight homewards. When a heron is seen to pass, a couple (a cast) of hawks are unhooded and "cast off," and the chase commences. The heron, seeing the falcons approach, disgorges its food, to lighten itself, and immediately ascends in the air; the hawks, eager in pursuit, and quicker of wing, speedily make upon it, and strive to gain a greater elevation by a series of beautiful gyrations. When one of the hawks succeeds in rising above the heron, it *stoops,* that is, descends swiftly, and in a direct line, upon the game, aiming a stroke with its outstretched legs and talons at its body; this the heron almost always succeeds at first in eluding, by a rapid and sudden movement aside. The second hawk, which by this time has also soared, then stoops, while the first is regaining its former altitude; and so on for many successive times, till one hawk at length clutches the heron or *binds,* upon which her companion joins her, and the three, buoyant by the motion of their wings, descend gently to the earth. The falconer's imperative duty is now to be up or near the spot where the three birds are descending, to divert the attention of the hawks before they reach the ground, and entice them from the quarry to him, by means of live pigeons as lures. This is very necessary, as the heron is extremely dangerous, and has been frequently known to injure the hawks with its sharp back when on the ground, though it is all but perfectly harmless while in the air. When the heron's wounds have been dressed—for this bird is rarely killed in such encounters—a ring with the captor's name is usually affixed to its leg, after which it is set at liberty, and so becomes available for future sport. The falconer's usual cry of encouragement to his hawks upon the springing of the quarry, is "Hooha-ha-ha-ha!" His cry when the quarry is killed, is "Whoop!" A falcon takes its pray either by tearing or *raking* it with the *hind* claw of each foot at the instant of passing, or by clutching the victim with its talons, and when she thus succeeds in binding to her quarry, she slowly descends with it to the ground. The supposition that the hawk strikes its quarry with the beak or breastbone in its swoop is a mistaken one.

Besides the peregrine falcon, the merlin is trained for F., and is extremely bold. This bird, however, is flown at small game, chiefly larks. The goshawk, though it does not soar and stoop, flies direct at its game: it is used chiefly for pheasants, rabbits, hares, etc., in an inclosed country. The sparrow-hawk, from its extreme boldness, is a great favorite, but is flown at smaller kinds of birds only, such as blackbirds and thrushes, etc. The hobby is seldom or never used.

The following are the principal terms used in falconry. A falcon's legs, from the thigh to the foot, are termed *arms;* toes, *petty singles;* claws, *pounces;* wings, *sails;* tail, *train;* crop, *gorge;* lower stomach, *pannel;* feathers, hair, etc., ejected at the mouth, *the castings.* A young hawk from the nest is *an eyess* or *eyas;* one that can hop, but not fly well, *a brancher;* a nestling hawk reared at liberty, is a *hack-hawk;* a young hawk able to take game, a *soar-hawk;* a mature wild hawk is a *haggard* or *blue hawk;* young hawks taken in their migrations, are *passage-hawks,* or *red hawks*—the term *red* being applied merely as a title of distinction between the young hawk and the eyess or nestling, the colors of the two being in reality the same. The training of the passage-hawk and haggard is termed *reclaiming;* fluttering, is *baiting;* fighting with each other, *crabbing;* sleeping, *jouking.* The prey is termed the *quarry.* When the hawk strikes her quarry in the air and clings to it, she *binds;* when she flies off with it, she *carries;* when she plucks it, she *deplumes.* Dead game is *the pelt. Stooping* or *swooping* is the act of descending with closed wings from a height at prey. Direct flight, without soaring, is *raking off;* changing from one bird to another, *checking.* When games flies into a cover, it *puts in.* When the hawk is molting her feathers, she is *mewing;* after her first molt, she is *intermewed;* with complete plumage, *summed;* when in good condition, she is *enseamed;* when out of condition, *seamed.* Mending the feathers artificially (an operation frequently performed when one has been accidentally broken) is termed *imping;*

blunting bill and talons, *coping*. When the falcon is obediently flying round in the air, she *waits on her master;* flying long-winged hawks from the wrist, is termed *flying out of the hood;* a couple of hawks is a *cast*. The *cadge* is a frame of wood, with four legs. It is carried by means of straps, which pass over the bearers' (the cadgers') shoulders, and is used, when there are several casts of hawks, to be taken to the field. The *block* is a round piece of wood, such as would be made by sawing a foot of wood out of a felled larch-tree of some 20 years' growth; and upon this the hawk sits when out of doors. Through the bottom of the block runs an iron spike, which being driven into the ground, secures the block to its place, and so prevents the hawk from dragging it away. Falcons are very pugnacious, and if not carefully kept separate, would soon kill each other. The *screen* or *perch* is a perch guarded by a falling piece of canvas, to support the hawks in case of their leaping down; upon this, the hawks are placed at night in an apartment called the *mews*.

The best works on the subject are those of Turberville and Latham respectively, as old treatises; and that of sir John Sebright, as comparatively modern. Of the more recent treatises, *Falconry in the British Isles*, by Salvin and Broderick; and *Falconry, its Claims and Practice*, by Freeman and Salvin, are standard authorities. See also Stonehenge's *British Rural Sports* (Lond., Warne & Co.)

The village of Falconswaerd, near Bois-le-Duc, in Holland, has for many years furnished falconers to almost all Europe. Sir John Sebright says: "I have known many falconers in England, and in the service of different princes on the continent, but I never met with one of them who was not a native of Falconswaerd."

FALE'MÉ, one of the most important tributaries of the Senegal (q.v.), into which it falls in lat. about 14° 40′ n., and long. 11° 48′ west. Its course has not yet been fully explored.

FALE'RII, a city of ancient Etruria, was situated w. of the Tiber, and n. of Mount Soracte. Its earliest historical appearance is in 437 B.C., when, according to Livy, the inhabitants (who were called Falisci) joined with those of Veii in assisting the Fidenates against the Romans. The Falisci were among the most dangerous enemies of Rome, and were the last of the Etrurians who submitted to its power. Their city was at last destroyed by the Romans (241 B.C.), and they themselves were compelled to choose a new site a few miles off. Here a Roman colony was settled in the time of the triumvirs, whence the place took the name of *Colonia Junonia Faliscorum*. But this Roman F. does not appear to have ever acquired any importance, for the temple which anciently attracted so many pilgrims, stood on the site of the older town. During the middle ages, however, a new city sprung up on the ruins of the Etruscan F., which finally obtained the name of *Civita Castellana* (q.v.). Ruins of the Roman or later F., consisting of a part of the ancient walls, are still visible.

FALER'NIAN WINE, so called from *Falernus Ager*, the district in which it was grown—and which lay in the northern portion of Campania, between the Massican hills and the northern bank of the Vulturnus—was one of the favorite wines of the Romans. It is described by Horace as, in his time, surpassing all other wines then in repute. In the time of Pliny, however, Falernian wine had already, owing to a want of care in its cultivation, begun to decline in quality.

FALIE'RI, MARINO, a celebrated Venetian, was b. about the year 1284. He was elected in 1354, at the age of 70, doge of Venice, and was the third of his name called to this supreme dignity. At the siege of Zara, in 1346, he defeated an army of 80,000 Hungarians, vigorously pursuing at the same time extensive siege-operations, and in the course of the war, having assumed the command of the fleet, captured Capo d'Istria. Subsequently he became ambassador of the repnblic to Rome and Genoa. Of an ungovernable and implacable temper, his bitter resentment seems to have been roused by a grossly offensive libel on his fair and youthful wife, the author of which, a young patrician named Michele Steno, owed some grudge to the doge. The punishment awarded to the young noble by a patrician tribunal seemed to F. wholly inadequate to the offense by which his ducal dignity had been outraged, and in order to avenge this double slight, he organized an audacious plot, with the object of overthrowing the republic, and massacring the heads of the aristocracy, to be followed by his own assumption of sovereign rights. The conspiracy was, however, revealed on the eve of its execution, and F. was arrested. He suffered death by decapitation on the 17th of April, 1355. In the hall of the great council, which contains the portraits of all the doges, the space allotted to that of F. is draped with a veil of sable, and bears the following inscription: "Hic est locus MARINO FALETRO, decapitati pro criminibus." A faithful representation of the plot, and of its chief confederates, is given in Byron's drama of *Marino Falieri*.

FALK, JOHANN DANIEL, 1768–1826; b. Germany. By the fame of a volume of satires, he made his way into the best literary society of the time. When the French invaded Germany, he went into the army, and so distinguished himself at the battle of Jena that he was made a councilor of legation. In 1813, he started a society for friends in necessity, and about the same period he founded an institute for the care and education of neglected orphan children, which subsequently became a free public school. In

1804, he published *Amphytrion*, a comedy, and *Prometheus*, a tragedy. For six years he published a satirical almanac, in which he so vigorously attacked the management of hospitals, that a movement for reform was begun and resulted successfully. In 1806, he founded a critical journal called *Elysium and Tartarus*.

FALK, PAUL LUDWIG ADALBERT, b. Prussia, 1827. He was the son of a Protestant clergyman, attended the Friedrich's gymnasium at Breslau, and studied law at the university of the same city. In 1847, he entered the state service of Prussia; in 1850, he was appointed state attorney at Breslau, and in 1853 state attorney at Lyk. In 1858, he was elected to the Prussian chamber of deputies, and served as a member of the committee on petitions, budget, and military affairs, 1858–61. In 1862, he was appointed councilor of the court of appeals in Glogau, Silesia, and in 1867 was elected to represent that district in the provisional parliament of the North German union. In 1868, he was permanently assigned as privy-councilor to the ministry of justice, and devoted himself zealously to the new codification of laws for the North German union, and afterwards for the German empire. In 1871, the emperor appointed Dr. Falk one of the representatives of Prussia in the federal council, where he acted as chairman of the committee of justice, and rendered important services in the reorganization of the system of legal proceedings. In 1872, Von Mühler, the secretary of state for ecclesiastical, educational, and medical affairs, resigned; and Falk was appointed his successor. In 1872, he introduced a law, which was passed Mar. 11 of the same year, according to which the supervision of all schools was declared to be the exclusive prerogative of the state. The law was carried against the united efforts of the Roman Catholic and conservative Protestant parties of the Prussian parliament. The bishops of the Roman church made a determined opposition to the new policy, instructing the clergy in a joint pastoral letter not to lay down their offices as school inspectors without previously consulting the diocesan bishop, In a memorial addressed to the government, they declared that they regarded this law as an encroachment upon the inalienable holy right of the church. Falk, however, continued by a number of measures to assert the exclusive right of the state to legislate in all school affairs. A rescript of June 15, 1872, excluded members of ecclesiastical orders and congregations from holding positions in the public schools. In May, 1873, an act was passed conferring upon the state the right of supervising Roman Catholic seminaries. It was required also that candidates for the clerical office should undergo a certain amount of secular training at the universities, and that every ecclesiastical appointment should receive the sanction of the secular authorities. A royal tribune for ecclesiastical matters was also set up. This legislation, which the pope denounced as invalid, was disregarded by the Roman Catholic bishops, and prince Bismarck, supported by Dr. Falk, imposed penalty after penalty in order to establish the supremacy of the state. Refractory bishops were imprisoned, deposed, and banished; the contributions of the government were withdrawn from the clergy who incurred its displeasure; religious orders were dissolved; and the administration of church property was taken from the clergy and invested in bodies of laymen. These measures have been famous as the May laws. Dr. Falk lost his seat for Berlin at the general election of members of the imperial parliament in July, 1878. Puttkamer, the present minister of ecclesiastical affairs, is of a more conciliatory nature, and, acting on instructions from prince Bismarck, he introduced a bill popularly known as the *Canossa* bill. This new bill is a great modification of the Falk laws, and was adopted July 14, 1880, in the diet, by only 206 against 202 votes. Its period is limited to Jan. 1, 1882. The most important concession consists in the permission granted to German clergymen to be educated in institutions of learning over which the Prussian government has no control, and over which the Jesuits preside. The alleged motive was to relieve the distress of the Roman Catholic population, and to fill numerous vacancies created by former removal of refractory priests.

FALKIRK, a Scottish parliamentary burgh, finely situated on a rising ground in the midst of a populous mineral and manufacturing district in Stirlingshire, and overlooking an expansive "carse," through which the river Forth, with its beautiful landscapes and constant life of sailing-vessels, slowly winds its devious way. F. consists principally of a long, irregular street, where there is an equestrian statue to the duke of Wellington, erected by public subscription in 1854. In 1859, a commodious exchange was built, in which a well-attended stock-market is held every Thursday. In 1868, excellent county buildings were erected, as well as also a new prison and county police-office. A hall, with accommodation for prosecuting various studies, was opened in 1878, for the Falkirk school of arts. A little to the s. of the town, the Union canal passes through a tunnel nearly half a mile in length. Pop. '71, 10,338. In 1600, F was made a burgh of barony by king James VI., in favor of Alexander lord Livingstone, afterwards earl of Callander, in whose favor also it was in 1646 created a burgh of regality by king Charles I. In 1715, it passed to the crown by the forfeiture of the earl of Linlithgow and Callander; and it was not till the passing of the reform bill in 1832 that it was made a parliamentary burgh, and received a municipal constitution, with a council of twelve, including a provost, three bailies, and seven councilors. It unites with Airdrie, Hamilton, Lanark, and Linlithgow, in sending a member to parliament. It has nine yearly fairs, an extensive inland trade, various local manufactures, and charitable insti-

tutions. Its parish church—the Eglais Bhrec, Varia Capella, or Speckled Kirk of our chartularies and of local tradition—has one or two monuments of some antiquity, but was itself rebuilt in the year 1810. The church, church lands, and barony belonged of old to the abbey of Holyrood. Near F., in 1298, sir William Wallace made his masterly retreat from the disastrous battle (see FALKIRK, BATTLE OF) in which he lost his brave companions in arms, sir John Graham and sir John Stewart, both said to be interred in the parish church-yard. The inscribed stone alleged to cover the grave of sir John Graham, is apparently more modern than his time. In 1746, the neighborhood of F. was the scene of another battle, in which the royal troops were defeated by those of prince Charles Edward. It is now chiefly noted for its cattle-trysts (cattle fairs), at which stock is yearly sold to the value of about £1,000,000. In the immediate vicinity are the Carron iron-works. F. is a station on the North British railway, and has water communication by the Forth and Clyde canal.

FALKIRK, BATTLE OF. Wallace had followed up his victory over the English near Stirling in 1297, by taking possession of some of the more important fortresses of Scotland. In the following year, king Edward, having returned from Flanders, summoned a great army to meet him at York, and marched northward to Roxburgh, and thence along the e. coast of Scotland and the shore of the firth of Forth. It was not till the day of the battle, the 22d July, 1298, that Edward first saw the enemy. The Scottish infantry, much inferior in numbers to the English, were arranged in four circular bodies on a small eminence near Falkirk, and were armed with lances, and with bows and arrows. The cavalry, numbering only 1000 men, were placed in the rear. This array was charged by the English cavalry. The Scottish footmen bravely withstood the onset of the well-appointed English horse; but the cavalry, dismayed by the preponderating numbers of the enemy, rode from the field without striking a blow. Thus left without support, the spearmen and archers were compelled to yield, and the retreat became general. The loss on the Scottish side is said to have amounted to 15,000 men. The results of this defeat were, that the military power of Scotland, such as it was, was broken; and Edward returned to England master of all the important strongholds of the south.

FALKLAND, a royal burgh of Scotland, in the co. of Fife, is situated at the north-eastern base of the Lomond hills, 22 m. n. of Edinburgh, and 10 m. s.w. of Cupar. The e. Lomond hill rises so abruptly behind the town as to intercept the rays of the sun from it for several weeks during winter. F. was in early times a manor of the earls of Fife. It passed from them to the crown in 1425, and was made a royal burgh by James II. in 1458. Within the town are the remains of Falkland palace—a large tower (in the same style as the north-western tower of Holyrood) above a vaulted doorway leading into the courtyard, built about 1500, and two sides of a quadrangle, built between 1530 and 1550, fine and interesting examples of Scottish architecture. The palace was a favorite residence of king James IV., and after his death, in 1513, his widow, the impetuous sister of king Henry VIII. of England, was here kept in restraint for a season. Here her son, king James V., died in 1542. The last king who occupied the palace was Charles II., who passed a few days in it in 1650. Of the more ancient castle in which David, duke of Rothesay, was imprisoned and starved to death by the duke of Albany, in 1402, no traces now remain. F. is frequently alluded to in the verses of sir David Lindsay. Pop. '71, 1283, who support themselves mainly by hand-loom weaving.

FALKLAND, LUCIUS CARY, Viscount, was b., it is believed, at Burford, in Oxfordshire, in 1610, and educated first at Trinity college, Dublin—his father, Henry Cary, viscount F., being at that time lord-deputy of Ireland—and afterwards at St. John's college, Cambridge. Even during his father's lifetime he enjoyed an ample fortune, left him by his grandfather. His earlier years were wholly devoted to study, and to the conversation of learned men, among whom he himself, by all accounts, must have occupied a first place. His residence (Burford) was only 10 m. from Oxford, and here, according to Clarendon, "he contracted familiarity and friendship with the most polite and accurate men of that university." The praise which that historian bestows on him is extraordinary; but F. is one of those historical personages whose character and abilities we must take on the word of friends and panegyrists, if at all, for his deeds and writings are not equal to his fame. In 1633, he was made one of the gentlemen of the privy-chamber to Charles I., and took part in the expedition against the Scots in 1639. In 1640, he entered parliament as member for Newport in the isle of Wight, and was at first distinguished by his patriotic zeal for the laws and constitution of his country. Against such men as Strafford and Finch he exhibited great severity of speech, though even in their case his almost finical love of the forms of legal procedure was manifested. Shortly after, he conceived it to be his duty to assume quite a different political standpoint, and to oppose what seemed to him the excesses and illegalities of the popular party. On the breaking out of the civil war, he consequently took part with the king, though mourning deeply the miseries which his country was about to suffer. He died a soldier's death at the battle of Newbury, Sept. 20, 1643. F. was quite unfitted to play a practical part in the sanguinary politics of his time; but his genuine love of England, and of the rights of the nation, which burned in him as

strongly when a royalist as when attacking Strafford and the bishops, enables us to understand better than we might otherwise have done, the deep indignation that possessed the English gentlemen who represented the commons, at the arrogant and unprincipled policy of Charles's advisers. F. wrote various treatises, etc., the principal of which is *A Discourse on the Infallibility of the Church of Rome.*

FALKLAND ISLANDS, the only considerable cluster in the South Atlantic, lie about 300 m. to the e.n.e. of the strait of Magellan, stretching in s. lat. from 51° to 52° 30', and in w. long. from 57° 40' to 61° 20'. After having successively belonged to France and Spain, they have, since 1771, formed part of the British empire, and in 1833 they began to be settled, being, as a whole, the most southerly of the organized colonies of England. These islands number about 200, presenting a total area of about 6500 sq. miles. The two largest members of the group, East Falkland and West Falkland, comprise between them more than half the surface; and of the remainder the chief ones are Great Swan, Saunders, Keppel, Pebble, Eagle, and Jason. This possession is valuable mainly from its position with respect to the Southern and Pacific oceans, being in this connection all the more valuable on account of its many excellent harbors. Both the soil and the climate are much better adapted to pasturage than to cultivation. While the natural grass is extremely luxuriant, scarcely anything but a few vegetables is grown in the settlement. The coasts teem with fish, more especially with cod; and in certain seasons of the year, penguins and seals are killed in great numbers, for the sake of their oil. The temperature is very different from that of the corresponding parallels in the s. of England—being both lower in summer and higher in winter. The mean of the former season is about 53° F., and the latter about 40°. These averages considerably exceed the vague estimates of early navigators, who, coming suddenly down from the tropical heats, appear to have felt here, by comparison, something of hyperborean cold. Though there is no timber worthy of the name, yet peat abounds to the depth of 10 feet. Pop. '71, 803; '77, 1336, of whom only 384 were females. Revenue of the colony in 1877, £3,286; expenditures, £6,266. Imports from England in 1877, £27,809; exports (chiefly wool, with oil, hides, tallow, and seal skins), £65,891. A good many acres have been reclaimed for horticulture in the neighborhood of Stanley, the seat of government; and a little barley and oats is cultivated. There is only one indigenous quadruped found, a kind of fox. Large cattle are now numerous. The sheep are chiefly Cheviots and Southdowns, of which the mutton finds a ready market on the spot. There are deposits of guano on West Falkland. The governor, the executive council, and the legislative council of the F. I. are all appointed by the crown.

FALL. The doctrine of the F. is the doctrine of the historical introduction of evil into the world, as described in the third chapter of the book of Genesis. The statement of this chapter, in its natural and obvious meaning, is to this effect, that the serpent, which "was more subtil than any beast of the field which the Lord God had made," tempted the woman to eat of the tree of the knowledge of good and evil, regarding which the Lord God had said, "Thou shalt not eat of it: for in the day that thou eatest thereof, thou shalt surely die." In contempt of this command and warning, "the serpent said unto the woman: 'Ye shall not surely die; for God doth know that in the day ye eat thereof, then your eyes shall be opened, and ye shall be as gods, knowing good and evil.' And when the woman saw that the tree was good for fruit, and that it was pleasant to the eyes, and a tree to be desired to make one wise, she took of the fruit thereof, and did eat, and gave also unto her husband with her, and he did eat." The result of this was, that their eyes were opened, and they knew that they were naked; and when they heard the voice of the Lord in the garden, they hid themselves; and on being summoned, they acknowledged their transgression, and were driven forth from Eden. Separate punishments, also, as the consequence of the transgression, were denounced against the serpent, the woman, and the man. The first was cursed above all cattle, and condemned to go upon its belly, and to eat dust all the days of its life. Enmity was to be put between it and the woman, and between its seed and her seed; "it shall bruise thy head, and thou shalt bruise his heel." The woman was to bring forth children in sorrow, and to be subject to her husband, to whom her desire was to cleave. The ground was cursed for the man's sake, and he was to eat of it in sorrow all the days of his life; in the sweat of his face he was to eat bread till he returned to the ground.

Such is the narrative of Genesis, upon which the doctrine of the F. is based. The doctrine assumes various forms, according to the interpretation which the narrative receives. Some theologians interpret the narrative more literally—although none can be said to do so quite literally—and others interpret it more figuratively; while others reject it altogether as a narrative, and look upon it merely as a mythical story of the early time—mirroring the lapse from a primitive golden age, or age of innocence.

1. Even the most orthodox theologians so far spiritualize the narrative, or regard it figuratively. The serpent, for example, is with them the devil, although the text in Genesis itself gives no hint of such an interpretation. The enmity between the serpent and the woman is the enmity between the devil and mankind; and the bruising of the head and the heel is supposed to represent the victorious conquest—although not without wounds and bruises—of Jesus Christ, as the Messiah, over the devil. The doctrine of

the F., according to the most common mode of interpretation, may be stated in the following terms: "Our first parents being seduced by the subtlety and temptation of Satan, sinned in eating the forbidden fruit. By this sin, they fell from their original righteousness and communion with God, and so became dead in sin, and wholly defiled in all the faculties and parts of soul and body. They being the root of all mankind, the guilt of this sin was imputed, and the same death in sin and corrupted nature conveyed to all their posterity, descending from them by ordinary generation."—*Westminster Confession of Faith*, c. vi. The F., in this view, is the temptation of our first parents to eat by the devil, and the inheritance of this act by their natural descendants. This may be said to be the orthodox doctrine of the Christian church.

2. Other theologians consider the third chapter of Genesis to be in the main allegorical—representing a picture of the violence of appetite in our first parents. In this view, the serpent is a mere imaginary accessory—the emblem of temptation; the supposed interview between God and our first parents is of the same character—the emblem of the voice of conscience following unlawful indulgence; the tree of the knowledge of good and evil represents some form of sensual indulgence. The only realities in the picture are the moral realities, conscience and temptation in some carnal form—realities which were no more powerful in the case of our first parents than they are in the case of all their descendants who yield to unlawful indulgence, as they did. The doctrine of the F., according to this interpretation, is simply the doctrine of the abuse of free will in our first parents; and the question of the relation of this primary sin to all subsequent sin, is variously regarded by this class of theologians. All of them would repudiate any formal imputation of it; yet all or most allow some actual transmission or inheritance of corrupted will, as the consequence of the original abuse of it.

The Pelagian theory maintained, indeed, that the race was not the worse of Adam's fall; but that, as our first parents "were to blame for yielding to a temptation which they might have resisted, so all of us, by a proper attention in cultivating our natural powers, may maintain our innocence amidst the temptations with which we are surrounded; and, therefore, that we fall short of that which it is in our power to do, if we do not yield a more perfect obedience to the law of God than Adam yielded." The Arminian theory, again, contended that the chief loss of the race, as the consequence of the transgression of our first parents, was the subjection to death thereby incurred, and the moral disadvantages arising out of the fear of death. Others, more orthodox than either, contend that the spiritual unity of the race necessarily implies that the depraved will of our first parents has descended to their posterity as their unhappy portion.

3. The opinion of those who look upon the chapter in Genesis as a mere myth or fable, representing a dream of the religious imagination, without any special moral meaning, cannot be said to come within the pale of Christian theology. The doctrine of the F. is with them only a devout idea, inconsistent with their principles of philosophy and history, and which, accordingly, they dismiss from their speculation or concern altogether.

FALLACY. The incorrect performance of the process of reasoning, so as to lead to error, is said to be a fallacy. The science of logic reduces sound reasoning to certain rules, and when any of these rules is violated, a logical fallacy is the result. There is always included in logical treatises a chapter on fallacies, in which the several kinds are classified and illustrated. In the old writers, there was always a division into two classes, according as the error lay in the *form* of the reasoning, or in the *matter;* the formal were entitled *in dictione*, or those appearing in the expression; the material were entitled *extra dictionem*, implying that the fault could not be detected from the language, but must be sought in a consideration of the meaning or subject-matter. As some of the designations employed in detailing these various kinds of erroneous reasoning have passed into common use, we shall first give a short notice of the ancient classification.

The formal, or those *in dictione*, were direct breaches of the laws of syllogism, or of argumentation from premises.

The fallacy of *undistributed middle* is one of the cases where what is called the middle term of a syllogism is used in two senses. "A term is said to be 'distributed' when it is taken universally, so as to stand for everything it is capable of being applied to; and, consequently, is 'undistributed' when it stands for a portion only of the things designated by it. Thus, 'all food,' or every kind of food, are expressions which imply the distribution of the term 'food;' 'some food,' would imply its non-distribution." In such a proposition as "all food is obtained from the vegetable or animal kingdoms," the term is distributed, because it is meant to be affirmed of every article used as food, that such article is derived from one or other of these two sources. But when we say "food is necessary for life," we mean only a limited number of articles. Hence such a syllogism as the following: "Food is necessary to life; corn is food; therefore, corn is necessary to life," is faulty from undistributed middle; the major proposition, "food is necessary," etc., has the form of a universal proposition, with the reality of a particular one.

The *æquivocatio*, or *ambiguous middle*, is the case where a word is used in two senses so different as to give properly no middle term, and, therefore, no connecting link

between the premises and the conclusion. A favorite example of this is the following: "Every dog runs on four legs; Sirius (the dog-star) is a dog; therefore Sirius runs on four legs." This is merely playing with the ambiguity of a word. Dr. Whately has shown that this fallacy may often arise with words derived from the same root, but acquiring from usage different significations; thus, "projectors are unfit to be trusted; this man has formed a *project*, therefore he is unfit to be trusted;" where the argument supposes that the meaning of "projector" and "one who has formed a project" is the same, which it is not.

The fallacy of *composition and division* arises by using a word distributively that is meant collectively; thus, "five is equal to two and three; two and three are even and odd; therefore five is even and odd."

"The fallacy of *accent* was an ambiguity arising from pronunciation. Thus, by a false accent in reading the commandment, "thou shalt not bear false witness against thy neighbor," it might be suggested that subornation is not forbidden, or that anything false except evidence is permitted, or that false evidence may be given *for* him, or that it is only against neighbors that false witness is not to be borne."

The *fallacia accidentis* is still a form of the ambiguous middle. It is when we conclude of a thing something that is only true of it accidentally, as, "wine is pernicious, therefore it ought to be forbidden." The premise is true only of the immoderate use; the conclusion refers to its use in every form. Another fallacy, the converse of this, is arguing *à dicto secundum quid ad dictum simpliciter* (passing from what is true in some respect to what is true absolutely). Of this the stock example is: "What you bought yesterday you eat to-day; you bought raw meat yesterday, therefore you eat raw meat to-day."

The most usually quoted of the second class of fallacies—*extra dictionem*—are the following:

Ignoratio elenchi, or "ignorance of the refutation." This means mistaking the point in dispute; or proving something that an opponent does not deny. This is common enough in controversy. See an example in point in ETHICS.

The *petitio principii*, or "begging of the question." This is when, instead of proving a position by some different position, something is assumed that is identical with what is to be proved. The most common form of this fallacy is what is termed *reasoning in a circle*, where we make two propositions mutually prove each other. The following would be an example of this mode of reasoning. Suppose we asked why smoke ascends, and any one were to answer, "because it is light;" we then inquire how it is known to be light, and the reply is, "because it ascends."

The *non causa pro causa*. This is a fallacy of insufficient induction, or the inferring a connection of cause and effect where there is only a mere sequence or accompaniment: as when we allege that the prosperity of England is due to its having an aristocracy, or an established church, or any other circumstance that has attached to the country, without ascertaining that there is any real causation between the two facts. Empiricism in medicine is of this nature; such a one took a certain medicine, and recovered from an illness, therefore the medicine was the cause of the recovery. The *post hoc, ergo propter hoc*, is another expression for the same fallacy, which is one of wide range, and whose rectification far transcends the limits of scholastic or formal logic.

The *argumentum ad hominem* is a reference to the circumstances of the party addressed, and means that although a certain reasoning may be good in itself, such party is not entitled to urge it, having perhaps already repudiated the same reasoning in other cases, or acted in a manner inconsistent with the employment of it. (For a full exemplification of fallacies according to the foregoing enumeration, see De Morgan's *Formal Logic*, Whately's *Logic*, sir William Hamilton's *Lectures on Logic*, etc.)

The subject of fallacies has received a much more comprehensive treatment in the work on logic by Mr J. S. Mill, who has enlarged the basis of the science itself, by placing induction at the foundation of reasoning, and by recognizing the necessity of laying down rules for the correct performance of that process. See INDUCTION. This enables him to give a proper place to some of the preceding fallacies, such as the *post hoc, ergo propter hoc*, which, although occurring in treatises of syllogistic logic, does not violate any rule either of syllogism or of any process included in such treatises. In fact, if we take a complete view of all the cardinal operations that enter into the establishment of truth by evidence, we ought to enumerate four such operations—Observation, including experiment; definition, or the right use of general terms; induction; and deduction or syllogism. Now, any one of these operations badly performed would necessarily lead to a wrong result, in other words, a fallacy. But in addition to the mistakes arising from the admission of insufficient evidence at any point, there is a class of errors (as well as truths) that arise from our receiving propositions without any evidence at all, on the ground that they are self-evident. In every case of reasoning, we must come at last to something that does not need a reason, as, for example, the evidence of our senses, or our actual observation; but we may sometimes admit as self-evident what is really not so, owing, perhaps, to our having a strong sentiment in the matter on hand. It is usual to consider the existence of an external material world, altgether independent of our minds, as certain in itself without requiring any proof or reason for the belief. It is found that we often commit mistakes in this way, and the mistakes thence

arising Mr. Mill illustrates under the title of fallacies of simple inspection, or fallacies *à priori*, which includes the whole of what may be termed natural prejudices. The other members of his classification follow his division of the processes concerned in the investigation of truth: they are fallacies of observation, fallacies of generalization, including induction, and fallacies of ratiocination or syllogism. He remarks, moreover, that error does not often take the form of a deliberate infringement of the rules of good observation, induction, or deduction, but rather consists in a confused perception of the premises involved. In other words, it is the "not conceiving our premises with due clearness, that is, with due fixity; forming one conception of our evidence when we collect or receive it, and another when we make use of it; or unadvisedly, and in general unconsciously, substituting, as we proceed, different premises in the place of those with which we set out, or a different conclusion for that which we undertook to prove. This gives existence to a class of fallacies which may be justly called fallacies of confusion; comprehending, among others, all those which have their source in language, whether arising from the vagueness or ambiguity of our terms, or from casual associations with them." It is in this group that Mr. Mill places the *petitio principii*, the *ignoratio elenchi*, and ambiguous language generally (*Logic*, book v.).

The scholastic fallacies were considered mostly in the light of weaknesses or involuntary errors of the intellect, to be corrected by sound rules or a good method of procedure. The syllogistic logician made little count of the natural prejudices, or strong emotions and passions of mind, which forcibly pervert the intellectual views, and render men averse to sound reasoning. This grand omission was first effectively supplied in the immortal first book of the *Novum Organon* of Bacon, who, in a vigorous and telling exposition, set forth some of the most powerful prejudices of the natural mind, and their influence in corrupting science and philosophy, as well the every-day judgments of mankind. Under the name of "idola" he classed four different species of these moral sources of error, against which the mind had to be fortified, not by syllogistic rules, but by a self-denying discipline, and a highly cultivated perception of the true end of science, which was to increase human power in all the arts of life. His first class of idola were *idola tribus*, or delusions common to the human mind generally, such as errors of the senses, the over-susceptibility of the mind to impressions of sense, the limits of the human faculties, and the interference of prejudices and passions; a very comprehensive class, which even he has failed to do full justice to. The next class are *idola specûs*, idols of the den or cavern, by which he understands the peculiarities and idiosyncrasies of individuals. The third class, *idola fori*, idols of the market, are intended to include the abuses of language, or the various ways that our conceptions of things are distorted by names. The last class are the *idola theatri*, theatrical illusions, under which he rebukes the great system-builders of antiquity, such as Aristotle, for introducing fanciful and irrelevant considerations into philosophy; and dwells especially on the corrupting influences of superstition and theology, and also the poetical tendencies of the mind, which are not satisfied with truth unless it can take on in addition a certain warmth or brilliancy of coloring.

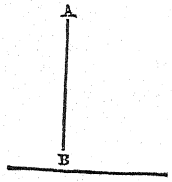
FALLING BODIES. Owing to gravity (q.v.), all terrestrial bodies, if unsupported, *fall*, or move towards the earth's center. When a falling body is absolutely without support, it is said to fall freely, as distinguished from one descending an inclined plane or curved surface. We shall here consider the two cases of free descent and of descent on inclined planes.

1. *Bodies falling freely.*—The first fact of observation regarding falling bodies is that they fall with a variable velocity; from this we infer that they are acted upon by some force. Again, on observing how the velocity varies, we find that its increments in equal times are equal; from this we conclude that gravity is a uniform force, which it is, at least sensibly, for small distances above the earth's surface. We have next to find a measure for this force. By experiment it is found that a body in 1″ falls through 16.1 ft., and that at the end of 1″ it moves with such a velocity, that if it continued to move uniformly after the 1″ expired, it would pass over 32.2 ft. in the next second. Hence 32.2 ft. is the measure of the velocity which has been generated in 1″, and is therefore the measure of the accelerating force of gravity; for the measure of accelerating force is the velocity which it will produce in a body in a second of time. The quantity 32.2 ft. is usually denoted by the letter g; and it is proper to mention here that this quantity measures the accelerating force of the earth's attraction on all bodies. Experiment shows that under the exhausted receiver of an air-pump all bodies fall with equal rapidity, and that the difference of velocities of falling bodies in air is due entirely to the action of air upon them.

As the accelerating force is uniform, it follows that the velocity generated in any time, t, will be given by the formula $v=gt$. Since the force is uniform, it must generate an equal velocity every second. In t'', therefore, it must generate a velocity gt, since it produces g in 1″. In 2″, a falling body will be moving with a velocity of 64.4 ft.—i.e., were the velocity to become constant for the third second, it would in that second move through 64.4 feet.

We are now in a position to inquire more particularly how bodies fall, and to answer such questions as first: What time will a body falling freely take to fall through a given

space? Second: What velocity will it gain in falling through a given space? Third: How high will a body ascent when projected straight up with a given velocity? etc.



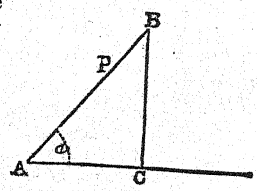
Let A be the point from which a body falls, and B its position at the end of the time t; and let AB = S. Then we know that at B the body has the velocity gt. Suppose, now, the body to be projected upwards from B towards A with this velocity gt—gravity acting against it, and tending to retard its motion. We know that at the end of a time t it will be again at A, having exactly retraced its course, and lost all the velocity with which it started from B, because gravity will just take the same time to destroy the velocity gt which it took to produce it. From this consideration we may obtain an expression for the space AB or S in terms of the time t. In the time t, the body rising from B with a velocity $= gt$ would ascend, if not retarded, a height ($\frac{gt}{2}$. t, or $\frac{gt^2}{2}$. But in the time t, gravity, we know, carried it through S; it will therefore, in the same time, by retarding it, prevent it going to the height $\frac{gt^2}{2}$ by a space = S. The space through which it actually ascends is then represented by the difference $\frac{gt^2}{2}-S$; but this space we know to be AB or S. Therefore $S = \frac{gt^2}{2}-S$; or $2S = \frac{gt^2}{2}$, or $S = \frac{1}{4}gt^2$. We may give this equation another form. For v being the velocity acquired in the time t, $v = gt$, $\therefore t = \frac{v}{g}$. Then $S = \frac{1}{2}g.\frac{v^2}{g^2} = \frac{v^2}{2g}$. Hence $v^2 = 2gS$. From these formulæ, we see that when a body falls from rest under the action of gravity, its velocity at any time varies as the time, and the square of its velocity as the space described.

If the body, instead of starting from rest, has an initial velocity V; and if v, as before, be the velocity at the time t, then evidently v is = the original velocity + that which is generated by gravity, or $v = V + gt$; and the space will be that which would have been described by the body moving uniformly with a velocity V + that which it would describe under gravity alone, or $S = Vt + \frac{gt^2}{2}$. With regard to the last two formulæ, it is easy to see that they may be made to suit the case of a body projected upwards with a velocity V, by a change of signs; thus, $v = V - ft$, and $S = Vt - \frac{gt^2}{2}$; gravity here acting to destroy velocity, and diminish the height attained. From the general formulæ in the case of an initial velocity, whether the body be projected upwards or downwards, we may express v in terms of S, as we did in the case of motion from rest. For $v^2 = (V \pm gt)^2 = V^2 \pm 2g(Vt + \frac{gt^2}{2}) = V^2 \pm 2gS$.

These are all the formulas applicable to the case of falling bodies, and by their means all problems in this branch of dynamics may be solved. It also appears that the formulæ above investigated apply to all cases of rectilinear motion of bodies considered as particles under the action of any uniform force. In all such cases, if f measure the accelerating force $S = \frac{1}{2}ft^2$, $v^2 = 2fS$, for the case of motion from rest; and $S = Vt \pm \frac{1}{2}ft^2$, and $v^2 = V^2 \pm 2fS$, for the case of an initial velocity.

The reader can easily frame examples illustrative of the formulæ for himself. We subjoin one: A stone falls down a well, and in 2″ the sound of its striking the bottom is heard. How deep is the well? Neglecting the time occupied in the transmission of sound, the formula $S = \frac{1}{2}gt^2$ applies, or S = depth = $\frac{1}{2}g$. 2^2, t being 2″; $\therefore$ depth = $2g$, or 64.4 feet.

2. *Bodies descending inclined planes.* In this case the formulas already investigated apply with a slight change. In the figure, if P be a body on the inclined plane AB, descending under gravity, we observe that only that resolved part of gravity parallel to AB is effective to make it descend, the other part at right angles to AB merely producing pressure on the plane. The angle of inclination of the plane being a, we know (see COMPOSITION AND RESOLUTION OF FORCES) that the resolved part of gravity parallel to the plane is g sin. a. The body, then, may be conceived to be descending under a uniform accelerating force g sin. a. We obtain the formulæ, accordingly, for descent on inclined planes by substituting g sin. a for f in the general formulæ given above. We notice, however, that in descent on inclined planes the velocity acquired is, as in the case of bodies falling freely, due solely to the vertical height through which the body falls. By our formula, $v^2 = 2g$ sin. a. S, where S, = AB, if the body falls from B. This may be written $v^2 = 2g$. S. sin. a, or = $2g$. AB. sin. a, or = $2g$. BC, since AB. sin. a = BC. But this is the same as the velocity acquired by a body in falling freely through BC. In fact, it holds generally true, that the velocity acquired by a body falling down the surface of any smooth curve is that due to the vertical height through which it has fallen; which might be proved in various ways, but is sufficiently clear from this, that any curve may be considered as a succession of inclined planes, indefinitely short in length, and great in number; for the proposition being true, as above proved, for each of them, will be true for all, and therefore for the curve.



For an account of the variations of the value of *g*, due to the earth not being a perfect sphere, and other causes, see EARTH. The reader is also referred to the article ATWOOD'S MACHINE. The theory of the descent of bodies under gravity was first discovered and taught by Galileo.

FALLING SICKNESS. See EPILEPSY.

FALLING STARS. See METEORS, *ante*.

FALL OF THE LEAF. See DECIDUOUS TREES and LEAVES.

FALLMERAY'ER, JACOB PHILIPP, a German traveler and historian, was b. 10th Dec., 1791, at Tschotsch, near Brixen in the Tyrol; studied at Brixen, and in 1809 went to Salzburg, where he gave instructions to pupils in history and Latin. At the university of Landshut, he studied law, history, and philology. When Germany rose against Napoleon in 1813, he entered the Bavarian army, and took part in several engagements. After peace was concluded, F. returned to his studies. In 1826, he was appointed to the chair of history and philology at Landshut. In 1831, he accompanied the Russian gen., count Ostermann-Tolstoy, in a journey to the east, visiting Egypt, Palestine, Syria, Cyprus, Rhodes, Greece, Turkey, and Italy. During 1830–40, he resided with count Ostermann-Tolstoy at Geneva, and in the course of the next eight years twice revisited the east. The events of 1848 recalled him to Bavaria, and for a short time he sat as a deputy to the Frankfort parliament, but after 1850, he lived privately in Munich. F. was a distinguished polyglott, and spoke a great number both of European and oriental tongues. His principal works are *Geschichte des Kaiserthums Trapezunt* (Münch. 1831); *Geschichte der Halbinsel Morea in Mittelalter* (2 vols., Stuttg. 1830–36); and *Fragmente aus dem Orient* (2 vols., Stuttg. 1845). His views on the origin of the modern Greek language have excited the liveliest controversy both in Greece and elsewhere. A complete edition of F.'s works appeared at Leipsic in 1861, entitled *Gesammelte Werke von Jakob Phillipp Fallmerayer*. He died in 1862.

FALLO'PIAN TUBES, THE (so called after Fallopius, who is usually, but incorrectly, regarded as their discoverer), or oviducts, are canals about 4 or 5 in. in length in the human subject, opening at their inner extremity into the upper angle of the uterus or womb, and at the other end, by a fringed funnel-shaped termination, into the cavity of the peritoneum. This fringed or fimbriated extremity at certain periods grasps the ovary, and receives the ovum, which is discharged by the rupture of the Graafian vesicle. See OVARIES. The ovum usually passes along the F. T. into the uterus, where it is either impregnated by contact with one or more spermatozoa, or is absorbed. Sometimes, however, the ovum becomes not only impregnated but retained, and further developed in the F. T., thus giving rise to one of the forms of extra-uterine pregnancy.

FALLO'PIUS, GABRIEL, a celebrated anatomist, b. at or near Modena, about the year 1523 (this date, however, is very uncertain), and died in 1562. If the date we have assigned is correct, he was only 25 when he was promoted from the university of Ferrara to a professorship at Piza, whence, after a few years, he was called to Padua, to succeed Vesalius, who had been compelled by the inquisition to resign his office. See VESALIUS. Cuvier characterizes him as one of the three *savants* who restored rather than created the science of anatomy in the 17th c., the two others being Vesalius and Eustachius. After a short but brilliant career, he died at the age of 40, and was succeeded by his favorite pupil, Fabricius ab Acquapendente.

He published numerous works in various departments of medicine, of which the most important is his *Observationes Anatomicæ, in libros quinque digestæ*, 1561, in which he corrects many errors into which his predecessor, Vesalius, had fallen. He was the first to describe with accuracy the ethmoid and sphenoid bones, and the minute structure of the ear (the canal along which the facial nerve passes, after leaving the auditory, is still known as the aqueduct of F.); the muscles of the soft palate, and the villi and valvulæ conniventes of the small intestine. In some of his supposed discoveries, he had been long anticipated; for example, the tubes passing from the ovary on either side to the uterus, and which bear his name, were known to, and accurately described by, Herophilus and Rufus of Ephesus, 300 years before our era. In addition to his anatomical fame, he had a considerable reputation as a botanist. He was the superintendent of the botanical garden at Padua; and a genus of plants, *Fallopia*, has been named after him. A complete edition of his works, in four folio volumes, was published in 1600.

FALLOUX, FRÉDERIC ALFRED PIERRE, Comte de, a French author and statesman, was b. at Angers, 11th May, 1811. His family was distinguished for its legitimist zeal, and at the restoration was rewarded by receiving letters of nobility. Young F. first drew attention to himself by two works penetrated by an ardent love of the old Bourbon order of things—*L'Histoire de Louis XVI.* (Paris, 1840), and *L'Histoire de Saint Pie V., Pape, de l'Ordre des Frères prêcheurs* (Paris, 1844). These indicate the level of his political and religious faith. In the elections of 1846, he was chosen deputy for the department Maine-et-Loire. In religion, he advocated the ideas of Montalembert; in politics, those of Berryer, but united with his legitimist sentiments a love of liberty and education strangely incongruous with the historic character of his party. After the revolution of Feb., 1848, he exhibited much energy as a member of the constituent assembly, was

one of those who organized the resistance to the insurrection of the 15th May, and, as reporter on the national workshops, pronounced for their immediate dissolution. He was also one of the most ardent promoters of the expedition to Rome. After the election of Louis Napoleon to the presidency, F. was appointed minister of public instruction, an office which he held only for ten months. After the events of the 2d Dec., 1851, he retired from public life to a country-seat near Angers, where he occupies himself with agricultural pursuits. In 1857, he was admitted a member of the French academy, and in the same year published at Tours his *Souvenirs de Charité*. He published in 1859 *Mme. Swetchine, sa Vie et ses Œuvres;* in 1863, *Méditations et Prières;* in 1864, *La Convention du 15 Septembre;* in 1865, *Itinéraire de Turin à Rome;* and in 1866, *Lettres inédites de Mme. Swetchine.* In 1869, he attempted to re-enter the assembly for the 3d circonscription of La Vendée, but was defeated by the official nominee.

FALLOW (from the same root as Ger. *fahl* or *falb*, Lat. *fulvus*, expressing a pale dun, tawny color). This word sometimes signifies waste, untilled land; but usually it is applied to land that is plowed and otherwise stirred, for a season without being cropped. The most of the wheat raised by the Romans was sown after the land was fallowed; indeed, the usual rotation was fallow and wheat alternately. It was only fertile soils that could long support such an exhausting system; hence resulted the decreasing produce which the later Roman agricultural authors so often speak of and lament.

The fallowing of land was introduced into all the countries which fell under the dominion of the Romans. During their sway in Britain, it soon exported large quantities of wheat; and for centuries after the Romans left it, no other mode of cultivating the land was followed. It may here be observed, that wherever the system of fallowing, without giving manure to the crops, is practiced, it necessarily supposes that the soil is at least moderately fertile. This system is most successful on argillaceous soils, which are retentive of organic manure. It must be borne in mind that the chief use of fallow is to liberate the plant-food which is already stored up in the soil as organic matter. The plowing and stirring, by admitting air, promotes decomposition, in the same manner as the turning over of a dunghill does; it also destroys the roots of the weeds that impoverish and choke the crops.

It was long before fallowing was introduced to any extent in Scotland; but about the beginning of the present century, it was largely practiced. Owing, however, to the draining of the soil, and the extension of the green-cropping system, it is now confined to the most retentive clay-soils, where it affords the only means of thoroughly cleaning the land. In a rotation of beans, clover, oats, fallow, wheat, and barley, each field is subjected to a process of fallowing once in every six, seven, or eight years, according to circumstances.

Fallow-fields usually receive a deep furrow in autumn. Lying exposed through the winter, the frost pulverizes the surface. In spring, when the weather becomes dry, the cultivator or the plow opens up the soil, and the process of extirpating the weeds goes on. Sometimes as many as three or four furrows are given in summer before the seed is sown in autumn. In old cultivated countries, land is commonly so much reduced in its organic matter, that fallows receive dressings of farm-yard manure, rape-dust, or guano, to obtain fertility.

Since the general introduction of green crops, the term fallow has departed in some measure from its original meaning. These crops are sown on what was formerly the fallow-break, and are now often styled fallow-crops. The land, no doubt, receives in some measure a fallowing, as the green crops are cultivated by the plow during their growth. Bastard-fallowing is a term which is used in Scotland when hay-stubble is plowed up in the end of summer, freed from weeds, and sown with wheat in autumn.

Where no express stipulation on the subject has been introduced into the lease, it has been held in Scotland, that, as the outgoing tenant might have taken a crop from the land, which, in accordance with the most approved principles of agriculture, he ought to leave fallow, and as the incoming tenant reaps the advantage in case of his abstaining from doing so, he is entitled to claim its value (Purves, Dec. 3, 1822. See Bell's *Principles*, s. 1263). "This decision," says Mr. Hunter (*Landlord and Tenant*, ii. p. 458), "has been deemed to have fixed the law." In conformity with the same principle, it has been ruled, that if the outgoing tenant received prepared fallow, the like should be left by him. A tenant who, on entering to his farm, had received a certain extent of fallow, prepared with manure, free of expense, was held bound to leave the same amount of fallow and manure as he had received, and to be entitled to claim payment only for the surplus (Brown *v.* College of St. Andrews, 11th July, 1851). But where a portion of land has been expressly reserved in the lease for fallow and green crop, for which the tenant was to receive merely a certain sum per acre for plowing, the rights of the parties are settled by the contract, and the tenant can claim no additional sum for fallow (Sheriff *v.* Lord Lovat, 13th Dec., 1854).

FALLOW CHAT. See WHEATEAR.

FALLOW DEER (*Dama vulgaris* or *Cervus Dama*), a species of deer well known in Britain, being very commonly kept in *parks*, as it is also in most parts of Europe. It is probably a native of the countries around the Mediterranean, and has been introduced by man into the more northern parts of Europe, where it is, however, now in some

places to be found wild in forests. It is doubted whether it has not been introduced by man, at a remote period, from the n. of Africa even into the s. of Europe, in all parts of which it is now at least completely naturalized. How far its geographic range extends eastward, is not very certainly known. It is represented in the sculptures of Nineveh. Its introduction into Britain is ascribed to James VI. of Scotland, who is said to have brought it from Norway when he brought home his queen, Anne of Denmark, and after his accession to the English throne, to have transported it to Enfield and Epping. Thousands of F. D. now exist in some of the English parks. They generally receive some attention and supplies of fodder in winter.

In size, the F. D. is smaller than the stag or red deer, from which it also differs in its broad palmated antlers, its longer tail, and its smoother and finer hair. In color, it is generally yellowish-brown in summer; darker, or even blackish-brown in winter; more or less spotted with pale spots, particularly in summer and when young; but in one variety the spots are very marked; in another they are not to be observed even in the young. The buttocks are white, and a dark line passes along the back. White F. D. are sometimes to be seen. The female has no horns. The male is called a BUCK (Fr. *daim*), the female a DOE (Fr. *daime*), the young a FAWN (Fr. *faon*). The name F. D. is derived from its color. See the article FALLOW, in agriculture. When the F. D. and red deer are kept in the same park, the herds seldom mingle, nor do hybrids occur. The F. D. loves the woods. The flesh of the F. D. is one of the most esteemed kinds of venison. The remains of fossil species nearly allied to the F. D. occur in some parts of Europe. The great fossil Irish *Elk* (q.v.) is allied to it.

FALL RIVER, a remarkable stream of Massachusetts, in the United States, is only about two m. long. Throughout nearly the whole of its course it tumbles between lofty banks over a rocky bottom, descending in its last half mile fully 130 feet. This lower section of the torrent is literally crowded with mills, which scarcely leave room for air and light between each other. The mouth is on the eastern arm of Narraganset bay. F. R. is the name likewise of the adjacent locality. The city of F. R. contains, '70, 26,766 inhabitants, who are chiefly employed in connection with the water-power already mentioned. The principal manufactures are woolens, cottons, and ironware. F. R. contains more spindles than any other city in the United States. It has an excellent harbor.

FALL RIVER (*ante*), a city and port of entry in Bristol co., Mass., near the boundary of Rhode Island, at the mouth of Taunton river where it falls into Mount Hope bay, 49 m. s. of Boston, reached by the Old Colony, the Providence, Warren, and Fall River, and the Fall River and New Bedford railroads; pop. '75, 45,340. It has more than 40 cotton mills, running nearly 1,300,000 spindles, and employing about $15,000,000 in capital. There are also other important manufactures; a city library, about 20 churches, banks, etc. It was once a part of Freetown, and was incorporated separately in 1803. A few years later it was called Troy, but the first name was restored in 1834. The city charter dates from 1854. It has risen to be one of the most important manufacturing centers in the country. A line of large and splendid steamboats connects it with New York.

FALLS, a co., in central Texas, on Brazos river, intersected by the Waco branch of the Houston and Texas Central railroad; 795 sq.m.; pop. '70, 9,851—4,681 colored. The surface is hilly or rolling prairie, partly covered with forests of ash, cedar, oak, etc. The soil is fertile; chief products, cotton, corn, and cattle. Co. seat, Marlin.

FALMOUTH, a parliamentary and municipal borough and seaport in the s.w. of Cornwall, on a w. branch of the estuary of the Fal, 14 m. n.n.e. of Lizard point, and 269 m. w.s.w. of London. It chiefly consists of a narrow street, a m. long, on the s.w. of the harbor, and of beautiful suburban terraces and villas on the heights behind. The harbor, one of the best in England, is formed by the estuary of the Fal, which is 5 by 1 to 2 m. in extent. It is 12 to 18 fathoms deep, and affords shelter to 500 vessels at a time. The mouth is defended on the w. by Pendennis castle, situated on a rock 198 ft. high, and which resisted a siege by Cromwell for six months; on the e. by Mawes castle, both built by Henry VIII. Pop. of the mun. bor. '71, 5,294; of the parl. bor., which includes Penrhyn, and returns two members, 16,819. F. was, till recently, one of the principal packet-stations for foreign mails. In 1876 the entries inwards were 956 vessels, of 142,175 tons; and the clearances outwards 554 vessels, of 48,605 tons. There is a great pilchard-fishery off the neighboring coasts. The chief exports are tin, copper, pilchards, and fuel. Here orange and lemon trees yield plenty of fruit on open garden-walls. F. arose in the middle of the 17th c., sir Walter Raleigh having at an earlier period drawn public notice to its capabilities; and it has been, since that time, a rendezvous for fleets and mail-packets proceeding abroad.

FALMOUTH, a township in Barnstable co., Mass., on Buzzard's bay, and Vineyard sound, noted for the important harbor of Wood's hole, now called Wood's holl, and becoming popular as a watering-place. Pop. of township, '70, 2,237.

FALSE, RULE OF, or FALSE POSITION, is a mode of reckoning, in cases where a direct solution of the question is impracticable. Any number is chosen at hazard, as that which is sought; this *false position* of course gives a false result, and from the

amount of the error, it is ascerained by proportion what the assumption ought to have been. *Ex.* what number is that whose half exceeds its third by 12? Assume 96 at random; 48—32 gives 16, which is too great; ∴ 16 : 12 :: 96 : 72, the number required. This method is now mostly superseded by the use of equations.

FALSE BAY, an inlet which may be referred either to the Atlantic, the Southern, or the Indian ocean. It washes the e. side of the mountainous district of s. Africa, which terminates in the cape of Good Hope, and extends eastward along the coast as far as False cape, measuring about 22 m. in length, and about the same in breadth. F. B. is, of course, sheltered from the n.w. monsoon, to which Table bay—the harbor of Cape Town—is exposed, an advantage which is more especially possessed by Simon's bay at its n.w. extremity. Hence, besides periodically receiving trading-vessels from Cape Town for temporary protection, it is permanently the station of the naval force of the colony.

FALSEHOOD. See FRAUD.

FALSE IMPRISONMENT. Every confinement of the person is an imprisonment, whether it be in a common prison or a private house, or in the stocks, or even by forcibly detaining one in the public streets (Coke, *Inst.* ii. 482). A man is liable for detaining the person of another, not only without cause, but without legal cause. Thus, where a man gives another in charge for committing an offense, the former is liable to an action for F. I., if he fails to substantiate his cause. Police-officers, also, are liable for apprehending a man without a competent warrant, or without reasonable suspicion. But where a felony has been committed, an officer is entitled to arrest on suspicion. Not only constables but private persons may arrest a man who commits a felony in their presence. A person who has falsely imprisoned another is liable to a criminal prosecution, and also to a civil action. In the former case he may be punished by fine and imprisonment; in the latter, he must pay such damages as are awarded. Any one detained without sufficient cause is entitled to apply for a writ of *habeas corpus* (q.v.) to procure his liberation. In Scotland, this species of offense is called wrongous imprisonment.

FALSE NEWS or RUMORS. Spreading false news to make a discord between the sovereign and nobility, is a misdemeanor, and punishable by the common law of England with fine and imprisonment. By statute of Westminster the first, c. 34, this penalty is confirmed. This statute is said by lord Coke to have been passed in consequence of the rebellion of Simon de Montfort (Coke, *Inst.* ii. 226). The law before the conquest had been more severe, and required that the author and spreader of false rumors should have his tongue cut out, if he redeemed it not by estimation of his head (or capitation tax). One of the articles against cardinal Wolsey was founded on this principle of common law. "Also, the said cardinal has busied and endeavored himself by crafty and untrue tales against your nobles of your realm."—Coke, *Inst.* iv. 92. The feeling of the present day is more in accordance with the axiom of Tacitus, *Convicia, si irasceris, tua divulgas, spreta exolescunt* (If you seek to revenge slanders, you publish them as your own; if you despise them, they vanish).

FALSE POINT, a harbor in the Cuttack district of Orissa, one of the best on the coast of India; lat. 20° 20′ n., long. 86° 4′ e.; the anchorage is safe, roomy, and completely land-locked. It is a regular port of call for Anglo-Indian coasting steamers. There is a large export trade with Mauritius, and other French colonies.

FALSE AND PRETENDED PROPHECIES, with intent to disturb the public peace, are punishable by several old statutes. By 33 Henry VIII. c. 14, this crime is made a felony; but by 3 and 4 Ed. VI. c. 15, continued by 7 Ed VI. c. 11, and by 5 Eliz. c. 15, the punishment is restricted to one year's imprisonment and forfeiture of £10 for the first offense; and for the second offense, imprisonment for life, and forfeiture of all chattels. These statutes apply to a particular class of prophecies—viz., prophecies "upon or by the occasion of any arms, fields, beasts, badges, or such other like things accustomed in arms, cognizances, or signets; or upon or by reason of any time, year, or day, bloodshed, or war, to the intent to make rebellion," etc. This description refers to predictions founded upon the heraldic bearings of particular families, which, in the state of public feeling at the time when the statutes were passed, might have been productive of discontent and sedition. The statutes are unrepealed, but are not likely in the present day again to be put in force.

FALSE PRETENSES, OBTAINING MONEY BY. By the common law of England, a man is not punishable as a criminal who has induced another, by fraudulent representations to part with the property of money or goods, unless the loss occasioned by the deception be of a public nature. Larceny or theft was the only species of wrongful abstraction of articles of value which was recognized, and where the consent of the owner to the transaction was obtained, no matter how fraudulently, the loser was left to a civil action for his relief. To remedy this effect in the law, the 33 Henry VIII. c. 1 was passed, whereby it was enacted that if any person should falsely and deceitfully obtain any money, goods, etc., by means of any false token or counterfeit letter made in any other man's name, the offender should suffer any punishment short of death, at

the discretion of the judge. This statute, however, only reached the case of deception by use of a false writing or token; the 30 Geo. II. c. 24 was therefore passed for the purpose of including all false pretenses whatsoever. Further alterations were made by subsequent statutes, until, by 24 and 25 Vict. c. 96, the previous legislation on the subject was consolidated. This is now the ruling statute in regard to false pretenses. The general principle is that, wherever person fraudulently represents as an *existing fact* that which is not an existing fact, and so gets money, etc., that is an offense within the act (Reg. *v.* Woolley, i. Den. C. C. 559). The false pretense must relate to some present fact, and therefore a promise merely to do some act is not such a false representation as will sustain a conviction. It is not necessary that the deception should be by words or writing, but any act tending to deceive will bring a person within the statute. Thus, a man at Oxford wearing a cap and gown, in order to induce a tradesman, of whom he ordered goods, to believe that he was a member of the university, is sufficient to warrant a conviction. The deception practiced, however, must not be simply as to the *quality* of an article, for this is regarded as merely a dishonest trick of trade, and not criminally punishable; it is also necessary that the owner should be deceived by the pretense; and where a tradesman is induced to part with goods to a regular customer, making a false statement, not on account of the statement, but from his belief in the credit of the party, the transaction is not punishable under the act. By 24, 25 Vict. c. 96, ss. 88 to 90, it is enacted that it shall be no bar to a conviction that the crime, on being proved, amounts to larceny, and that it shall not be necessary to prove an intent to defraud any particular person; that the delivery of money, etc., to another person, for the benefit of the party using the deception, and also the obtaining signature to, or destruction of, a valuable security, etc., by a false representation, shall subject the offender to punishment. The same statute, ss. 46 and 47, contains a salutary provision, that any person attempting to extort money by threatening to accuse another of certain felonies, or of an infamous crime, is liable to penal servitude for life.

In Scotland, this offense is known as falsehood, fraud, and willful imposition. Each species of the offense which in England is punishable under the statute, in Scotland is indictable at common law. Thus, false personation, as where a man, in the assumed character of an exciseman, received money as a composition for smuggled goods, has been held to warrant a conviction of falsehood. So, also, where the deception consists in fictitious appearances; as where a man, by fitting his shop with false bales, induced another to trust him with goods. Obtaining money by begging-letters, and the common practice of chain-dropping, fall under this denomination of crime.

FALSE RETURN, Action for. Where a sheriff makes a false return to a writ, the party injured may maintain an action against him for damages. Thus, a return of *non est inventus* to a writ of *capias*, when the defendant might have been apprehended, or a return of *nulla bona* to a *fieri facias*, when there were goods which might have been seized, renders the sheriff liable in damages to the amount of loss occasioned by his negligence.

FALSE SIGNALS. By 7 Will. IV. and 1 Vict. c. 89, s. 5, the exhibiting any false light or signal, with intent to bring any ship or vessel into danger, is made felony, and punishable with death. The felonious intent may be proved by declarations made by the accused, or by circumstances which fairly lead to the conclusion of a guilty purpose. The punishment of death is recorded, but is not in fact carried out.

FALSE SWEARING. By 19 and 20 Vict. c. 79, s. 178 (bankruptcy, Scotland), any person guilty of falsehood in any oath made in the pursuance of the act, shall be liable to a prosecution at the instance of the lord advocate, or of the trustee in the sequestration, with consent of the lord advocate. But in the latter case, the prosecution must be authorized by a majority of the creditors present at a meeting called for the purpose. The person, on conviction, is liable, in addition to the punishment awarded, to forfeit, for behoof of the creditors, his whole claim under the sequestration. In England a bankrupt is not put upon oath; but on making a false declaration, he is deemed guilty of a misdemeanor and punishable with the penalty of perjury.

FALSET, or Falsetto, a term in singing for the highest register of a man's voice, which joins the natural or chest voice, and which, by practice, may be so blended with the chest-voice as to make no perceivable break.

FALSE VERDICT. The remedy in cases where it was alleged that a F. V. had been returned, was formerly by means of a writ of attaint. This writ originally lay only in cases where the jury had returned a verdict on their own knowledge of the facts, and proceeded on the assumption that, in returning a F. V., they were necessarily perjured. The case was heard before 24 men, and in case the original verdict was found bad, the jurors incurred the penalty of infamy and forfeiture of their goods. By statute of Westminster the first, c. 34, a writ of attaint was allowed upon an inquest; i.e., where cases had been decided upon evidence adduced. But the universal rule now established is, that though in most civil cases a new trial may be had for various causes, in no case can jurymen be punished, though finding a verdict against evidence. Writ of attaint was abolished by 6 Geo. IV. c. 50, s. 60.

FALSE WEIGHTS AND MEASURES. The use of false weights and scales is an offense at common law in England, and punishable by imprisonment. In Scotland, by 1607 c. 2, the users of false weights are punishable by confiscation of movables.

FALSIFY'ING RECORDS. The injuring or falsifying any of the documents of a court of justice is, by several modern statutes, made a serious offense. Any person obliterating, injuring, or destroying any record, writ, etc., or any original document belonging to any court of record or of equity, is guilty of felony, and is liable to be kept for 3 years in penal servitude, or be punished by 2 years' imprisonment, with or without hard labor, 24 and 25 Vict. c. 96, s. 30. By 24 and 25 Vict. c. 98, s. 28, any person employed to furnish certified copies willfully certifying any document as a true copy, knowing the same is not so, is guilty of a felony, and subject to 7 years' penal servitude. This act does not extend to Scotland. By 1 and 2 Vict. c. 94, any person employed in a public record office certifying any writing to be a true copy, knowing the same to be false in any material part, is guilty of felony, and may be punished with penal servitude for life.

FALSTER, a Danish island in the Baltic, s. of Seeland, lies between lat. 54° 30′ and 54° 58′ n., and between long. 11° 45′ and 12° 11′ e. It is separated by the strait called the Grönsund from the island of Moen, and by that called the Guldborgsund from the island of Laaland, together with which F. forms the stift or province of Laaland, a province which contains in all 635 sq.m., and which has about 200,000 inhabitants. F. is about 26 m. long, and 16 wide at its widest part, and has an area of about 178 sq. miles. It is flat, remarkably fruitful, and well cultivated, so that it resembles an attractive garden, and maintains in all about 23,000 inhabitants, who employ themselves chiefly in agriculture and cattle-breeding. The chief town is Nykjöbing, on the Guldbergsund. It is very old, has a castle and a cathedral, has some commerce and shipbuilding, and a pop. of (1870) 3,645. The only other place of any note is Stubbekjöbing.

FA'LUN, or FAHLUN (called also *Gamla Kopparberget*, i.e., the "old copper-mine"), is a t. of Sweden, capital of the län, or province, of the same name. It has long been famous for its copper-mines, though the quantity of ore now obtained is much smaller than formerly. In 1650, the yield was 3000 tons annually; this, however, declined, in 1690, to 1900 tons; while at present it is only about 400 tons. Gustavus Adolphus called the mines the "treasury of Sweden." The excavations extend for miles underground, containing vast chambers, where Bernadotte, the late king, gave splendid banquets, on which occasions the mines were brilliantly lighted up. F. is regularly built, and its houses are of wood, and blackened by the fumes of the numerous smelting-furnaces. Pop. '77, 6,741.

FALUNS, a term given by the agriculturists of Touraine to shelly sand and marl, which they use as manure, and applied by geologists to the deposits from which they are obtained. They are loosely aggregated beds of sand and marl, but occasionally so compacted by calcareous cement as to form a soft building-stone. The animal remains contained in them are chiefly marine, and of a more tropical fauna than that of the Mediterranean. A few land and fluviatile mollusca are found mixed with the oceanic forms, and with these are associated the remains of terrestrial quadrupeds, as dinotherium (q.v.), mastodon (q.v.), rhinoceros (q.v.), etc.

FA'MA (Gr. *pheme*) the goddess of rumor, appears in the works of the earliest poets. Sophocles makes her the child of Hope; Virgil, the youngest daughter of Terra, the sister of Enceladus and Cœus.

FA'MA CLAMO'SA, in the ecclesiastical law of Scotland, is a wide-spread report, imputing immoral conduct to a clergyman, probationer, or elder of the church. A F. C., if very clamant, may form the ground of process by a presbytery, without any specific complaint being brought before them, or there being any particular accuser. In these circumstances, the presbytery act for the vindication of their own order, and in behalf of the morals of the community. Should the inquiries of the presbytery lead them to the conviction that the rumor is not without foundation, they will serve the accused party with a libel, and thus bring him for trial before them. (Hill's *Church Prac.* 49; Cook's *Styles;* and Wood *On Libels.*)

FAMAGOS'TA, or FAMAGUSTA, is a seaport on the e. coast of Cyprus, on the supposed site of ancient Arsinoë, about 35 m. from Lefkosia (q.v.), the present capital of the island. It was a place of importance in the crusades, and under the Venetians from 1489 to 1571 it became a rich and flourishing city; with a population of fully 30,000 inhabitants, now only a few hundreds find shelter amongst the filthy ruins, the wreck of its churches and palaces. On coming under the sway of the Turks after a siege of four months, it fell into a state of decay; an earthquake in 1735 completed its ruin. The town is enclosed within well-built walls, constructed from the ruins of Salamis; but of its 300 churches, only one, that of St. Nicholas, remains. It is now used as a mosque, but contains many monuments of its former use, and is a fine specimen of medieval architecture; in it Richard I. of England crowned Guy de Lusignan king of Cyprus, in 1191. F. possesses a good natural harbor, about 8,000 ft. long, by 2,000 ft. wide, which would require to be cleansed before it could admit ships of the largest tonnage. The water in the bay exceeds 170 fathoms in depth. Under Turkish rule F. was

simply regarded as a military fortress and occupied by the sultan's troops; since Cyprus became a British possession, the affairs of the town and province have been administered by a resident civil commissioner and his assistant, with numerous native officials. About 5 m. n. are the ruins of ancient Salamis. Chief exports of F. are corn and pomegranates, for which the district is famous.

FAMAGOS'TA, or FAMAGUSTA (*ante*). See CYPRUS.

FAMILIARS. See INQUISITION.

FAMILIAR SPIRITS, a term employed to denote certain supernatural beings, in attendance upon magicians, wizards, witches, conjurors, and other skillful professors of the black art. The word "familiar" is in all likelihood derived from the Latin *famulus* (a "domestic," a "slave"). The belief in such spirits goes far back into the history of the race. We read of them in the time of Moses, who admonishes his countrymen to "regard not them that have familiar spirits" (Lev. xix. 31), which would imply the prevalence of the superstition among the Egyptians. The word in the original rendered "familiar spirits" is *oboth;* it is of frequent occurrence in the Hebrew Scriptures, and literally signifies "leathern bottles;" thereby indicating the antiquity of the idea that magicians were wont to imprison in bottles the spirits whom their spells had subdued (whence our "bottle-imps and "bottle-conjurors"); the origin, again, of which grotesque belief is perhaps to be sought for in the circumstance that mystical liquids kept in vials have been immensely in vogue among the conjurors of all ages and countries. It is not clear, as some think, that we can include Socrates among those who shared this vulgar superstition, for although he spoke of his attendant "dæmon" in very ambiguous terms, the opinion of all enlightened critics is, that he meant by the word nothing more and nothing less than what Christians mean by the presence of a divine light and guide in the heart and conscience. But according to Delrio—a great authority on this subject—the belief in familiar spirits in the grosser and more magical form did exist among the ancient Greeks, who, he affirms, designated such beings *paredrii*, "companions," as being ever assiduously at hand. The story of the ring of Gyges, king of Lydia, as narrated by Herodotus, is held by Heywood (see *Hierarchie of the Blessed Angels*, etc.) to prove the existence of the belief in that country also; and it is quite certain that during the middle ages the belief in "enchanted rings" containing familiar spirits was widely diffused throughout Europe, the magicians of Salamanca, Toledo, and those of Italy, being especially famous for their skill in thus subjugating and imprisoning demons. Asia, in fact, would seem to have been the original home of the belief in familiar spirits, which has long been established as a cardinal superstition of the Persians and Hindus, and which appears in perfection in the *Arabian Nights*. The "slave of the lamp" who waits upon Aladdin is an example in point. Whether the belief in familiar spirits sprung up independently among the nations of western Europe, or was transplanted thither by intercourse with the east, does not clearly appear. A favorite form assumed by the familiar spirit was that of a black dog. Jovius and others relate that the famous Cornelius Agrippa (q.v.), half philosopher, half quack, was always accompanied by "a devil in the shape of a black dog;" and add, that when he perceived the approach of death, he took a collar ornamented with nails, disposed in magical inscriptions, from the neck of this animal, and dismissed him with these memorable words: *Abi, perdita Bestia, quæ me totum perdidisti*—("Away, accursed beast, who hast ruined me wholly for ever"). Butler, in his *Hudibras*, speaks highly of this animal:

> Agrippa kept a Stygian pug
> I' the garb and habit of a dog
> That was his tutor, and the cur
> Read to the occult philosopher,
> And taught him subtly to maintain
> All other sciences are vain.

The readers of Goethe, too, will remember that Mephistopheles first appears to Faust and Wagner during their evening walk in this shape; but, in truth, the earliest instances of such transmigration are much older, at least if medieval tradition can be credited, for it assures us that Simon Magus and other ancient magicians had familiar spirits who attended them in the form of dogs. Curiously enough, in spite of the servitude to which the attendant imps were reduced by the potent spells of the magicians, they were popularly supposed, during the middle ages, to have their revenge at last, by carrying with them into eternal torment the souls of their deceased masters. This idea of divine retribution overtaking the practicers of magic is, however, not found *out* of Christendom. The Jews think not the less but the more of Solomon because he was, as they say, one of the greatest of magicians; and a similar feeling in regard to "wonder-workers" pervades eastern nations generally, though it is to be noticed that the latter are often represented as using their power malignantly. See MAGIC.

FAMILY (Lat. *familia*). Though we are in the habit of regarding the life of antiquity, and more particularly that of Greece, as less domestic than that of Christian Europe (and probably with reason), the idea of the family or house (Gr. *oikós*), as the nucleus of society, as the political unit, was there very early developed. Aristotle speaks of it as the foundation of the state, and quotes Hesiod to the effect that the original family consisted of the wife and the laboring ox, which held, as he says, to the

poor the position of the slave (*Polit.* i. 1). The complete Greek family then consisted of the man and his wife and his slave; the two latter, Aristotle says, never having been confounded in the same class by the Greeks, as by the barbarians (*Ib.*). In this form, the family was recognized as the model of the monarchy, the earliest, as well as the simplest, form of government. When, by the birth and growth of children, and the death of the father, the original family is broken up into several, the heads of which stand to each other in a co-ordinate rather than a strictly subordinate position, we have in these the prototypes of the more advanced forms of government. Each brother, by becoming the head of a separate family, becomes a member of an aristocracy, or the embodiment of a portion of the sovereign power, as it exists in the separate elements of which a constitutional or a democratic government is composed.

But at Rome the idea of the family was still more closely entwined with that of life in the state, and the natural power of the father was taken as the basis not only of the whole political, but of the whole social, organization of the people. In its more special aspects, the Roman idea of the family will be explained under PATRIA POTESTAS. Here it will be sufficient to state that with the Romans, as with the Greeks, it included the slave as well as the wife, and ultimately the children; a fact which indeed is indicated by the etymology of the word, which belongs to the same root as *famulus*, a slave. In its widest sense, the *familia* included even the inanimate possessions of the citizen, who, as the head of a house, was his own master (*sui juris*); and Gaius (ii. 102) uses it as synonymous with *patrimonium*. In general, however, it was confined to persons—the wife, children, grandchildren, and great-grandchildren, if such there were, and slaves of a full-blown Roman citizen. Sometimes, too, it signified all those who had sprung from a common stock, and would have been members of the family, and under the potestas of a common ancestor, had he been alive. See AGNATE. In this sense, of course, the slaves belonging to the different members of the family were not included in it. It was a family, in short, in the sense in which we speak of "the royal family," etc., with this difference, that it was possible for an individual to quit it, and to pass into another by adoption. See ADOPTION. Sometimes, again, the word was used with reference to slaves exclusively, and, analogically, to a sect of philosophers, or a body of gladiators. See Smith's *Dictionary of Greek and Roman Antiquities.*

The whole social fabric is based on the grouping of human beings in families; an arrangement which is in harmony with all the conditions and wants of human life, and which tends to foster those habits and affections that are essential to the welfare of mankind. A prosperous community must be an aggregate of happy families; there being little true happiness in the world that is not intimately connected with domestic life. The formal bond of the family is marriage (q.v.: see also POLYGAMY); and an essential condition of its right development seems to be a distinct abode, which shall be not a mere shelter, but a house or *home*, affording a certain measure of comfort and decency, according to the standard prevalent in the community. See *Genius and Design of the Domestic Constitution*, by Rev. Christopher Anderson (Edin. 1826).

FAMILY. See ORDER, *ante.*

FAMILY OF LOVE. See AGAPEMONE.

FAMINE, PORT, an abortive settlement of Spain, on the northern side of the strait of Magellan, is situated in lat. 53° 38′ s., and long. 70° 58′ west. It owes its name to the death, by starvation, of the Spanish garrison; and it is said to be now a penal colony of the republic of Chili. Some voyagers, however, have spoken of the neighborhood as "covered with flowers," and "decorated with luxuriance," and capable of being made, so far as soil is concerned, "one of the finest regions in the world."

FAMINES has been supposed to furnish a needful check upon an inordinate growth of population; and with that view, they have been deemed useful regulators of the universe. A table, recently prepared by Cornelius Walford, read before the statistical society of London in 1878 and 1879, and published under the title, *On the Famines of the World, Past and Present*, enumerates more than 350 famines which have occurred in history. It includes those mentioned in the Bible as afflicting Palestine and the neighboring nations in the time of Abraham (Gen. xii. 10), and of Isaac (Gen. xxvi. 1); the seven years' famine in Egypt; those in ancient Rome; those which have visited the three divisions of Great Britain; those of Europe in the middle ages; the 34 famines of India; and the terrible calamity which has lately ravaged northern China. The table does not claim to be exhaustive. Famines are known to have occurred in China, of which no details have been found; and similar instances have probably existed in Persia and elsewhere in Asia.

The paper teaches that famines have frequently resulted from want of human foresight, or the failure of human expedients. Analysis discloses the following causes of famine which might have been averted or ameliorated:

War.—It draws from their employments those who would be engaged in the cultivation of the soil; it withholds the labor necessary to gather the crops already produced; it often devastates the plains in order to starve out an enemy; it wastes and destroys at every step. At sea, it blockades ports, and diverts cargoes from their destinations; on land, it cuts off armies, cities, districts, from their supplies. Still further, war breeds pestilence; pestilence cuts off many who have escaped from the sword; the land lies

uncultivated; the live stock dies; and desolation follows. Hence the sword, pestilence, and famine are now, as they have been in all time, three associated deadly enemies of the human race.

Defective agriculture may result from ignorance, indifference, or unsuitability of climate, or location. Where the produce of the soil barely meets the current requirements of the inhabitants, it is clear that either the failure of a crop, or a sudden influx of strangers, may produce at least temporary famine. The distress in Ireland in 1879–80 was due in a large degree to the failure of the crops. Potatoes, still the staple food of a large proportion of the population, are set down in the agricultural returns of 1879 at 1,113,676 tons, against 2,526,504 tons in 1878; and of turnips there were but 2,057,804 tons, as compared with 4,686,226 tons of the previous year. The loss in money value to Ireland from this unfavorable harvest was estimated at over $50,000,000 as compared with 1878. This loss was distributed very evenly over the entire country, but its effect on the usually prosperous counties was only impoverishment, while it reduced to starvation those districts entirely dependent on this precarious article of food.

Deficient transportation was formerly a frequent cause of famines. Because of the bad state of the roads a famine has prevailed in one part of a country when there was a superabundance in another. The construction of canals, and subsequently of railroads, has greatly relieved this difficulty. In India the late famines might have been overcome if not averted, but for the want of the means of transport.

Legislative interference has been another cause of famines. It is not contended that in periods of emergency government should not step in and endeavor to mitigate the necessities of the hour; notable examples of such temporary restrictive regulations were shown by the more enlightened nations of antiquity; but it is a great mistake to attempt to regulate commerce to the subversion of the great principles of supply and demand. As an instance, we may cite the corn laws of Great Britain, which were repealed only at the indignant demand or the nation as recently as 1846. There is no doubt that the corn laws often prevented exportation of grain; but they permitted its importation only when prices reached or exceeded certain predetermined limits. The Irish famine of 1845–46 hastened their repeal.

Currency restrictions which tend to debase the value of current money, and thereby to lessen its purchasing power, especially in times of scarcity. The obvious manner in which a debased currency of paper or metal may operate in periods of scarcity is, that its purchasing power in all dealings with other nations is lessened not only in the degree to which it has been debased, but even to a greater extent by the prejudice, or the want of confidence, which its known debasement has inspired. Thus, if a merchant seeks to buy grain abroad, where the coinage value will have to be measured in relation to some coin of the country wherein the purchase is made, or in relation to the standard value of the precious metals in such country, it is certain that the coin tendered will have a purchasing power only in exact relation to its intrinsic character.

Speculating in grain and other food stuffs, known technically as forestalling, engrossing, regrating, etc., has undoubtedly tended to create famines, and in England offenses of this character were prohibited by statute in 1552, but these laws were in their nature arbitrary, and could be tolerated only because they appeared to be made in the interest of the people. Such laws are contrary to all known principles of political economy. Adam Smith and his followers succeeded in proving that no rational argument could be given for upholding them, and were largely instrumental in their final repeal.

Misapplication of grain. Under this head is mainly to be noted the excessive use of grain in brewing and distilling, and by burning, whether willfully or by misadventure; also those wanton acts of waste, such as burning grain-stores, firing ricks, which have too often occurred during periods of scarcity.

Among the natural causes of famines are:

Rain. By excess of rain the soil becomes saturated, and seed decays. In hilly countries the seed is sometimes washed entirely out of the ground, and so is destroyed. This cause of famine is most frequent in tropical countries, where the rains often become torrents. Improved cultivation of the land, with good drainage, is the most effective remedy. Inundations from the sea, from rivers, from inland lakes, fall within this category, and have caused great mischief.

Frost. In temperate regions frost in several forms is destructive to vegetation. In the case of grain cultivation it may, by setting in early, prevent the efficient manipulation of the soil, and the sowing of the autumn seed. Or by being protracted beyond the early months of the year, it will prevent spring sowing, and even seriously injure the young crops. Combined with rain it will frequently destroy the vitality of the seed while yet in the ground. In France and other wine and olive producing countries, the damage occasioned by frost is immense. Such damage, as well as that occasioned by floods, is there a recognized danger against which insurance is purchased.

Drought. In all climates of a tropical character, drought is an important agent in preventing the development of vegetation. With moisture, solar heat develops luxuriant growth; without the moisture there is absolute sterility. The early Bible records refer to the rising of the waters of the Nile as the event upon which the fertility of Egypt depends. About 1060, the overflowing of this great river failed for seven successive years, occasioning one of the greatest famines of history. Two provinces were wholly

depopulated, and in another, half the inhabitants perished. Even in temperate climates long-continued drought is very disastrous.

Earthquakes seem to have but little influence in producing famine, except in the immediate locality of their devastations. Where, however, they have produced irruptions of the sea or inland waters, which has not infrequently been the case, the damage has been extensive.

Hurricanes and storms frequently produce wide-spread injury. They also lead to irruptions of the sea, and to the overflowing of rivers; but as a rule these occur at periods of the year when grain and other crops are not sufficiently advanced to sustain serious damage by shaking or otherwise, or else when they have been harvested.

Hail-storms are usually local in their effects—rarely extending beyond 60 m. in their greatest length, and some 6 m. in width, and generally confined to much smaller limits. They are most prevalent and destructive to grain and fruit in the summer and autumn months. In France hail-storms are frequent and severe. The damage which they occasion has long been insured against in all parts of Europe.

Insects, vermin, etc. Insect plagues appear to have afflicted mankind from a very early period. Thus, flies and locusts were among the plagues of Egypt. The potato-growing regions of the United States and Canada have been seriously afflicted in the last twenty years by the various species of insects known as potato-bugs. The recent famine in North China began in one district by a visitation of locusts. In India such visitations have occurred several times. England has suffered by plagues of insects, especially in 476, and again in 872. But few instances are recorded in which rats, mice, etc., destroyed crops to any serious extent. In 1581, there was a plague in Essex, England, and in 1812–13, a plague of rats in the Madras presidency, which in part occasioned the famine of that year.

Famines Celebrated in History.

B.C.

1708. Egypt; the famine of seven years began.
436. Rome; thousands threw themselves into the Tiber.

A.D.

42. Egypt; awful famine.
262. Rome; attended by plague.
272. Britain; people ate the bark of trees.
306. Scotland; thousands died.
310. England; 40,000 perished.
370. Phrygia; awful famine.
450. Italy; parents ate their children.
739. England, Wales, and Scotland.
823. again; thousands starved.
954. again; lasted four years.
1016. Awful famine in all Europe.
1087. England, 21st year of William I.
1193. England and France; produced pestilential fever, until 1195.
1251. England.
1315. England; people ate horses, dogs, cats, and vermin.
1335. England; caused by long rain.
1353. England and France.
1438. England; bread was made from fern roots.
1565. Great Britain.
1693. France; awful famine.
1748. Great Britain; general throughout the realm.
1771. Bengal; devastated the country.
1775. Cape de Verde; 16,000 persons perished.
1789. France; grievously felt.
1795. England; severely felt.
1801. England; throughout the kingdom.
1813. Drontheim; when Sweden intercepted supplies.
1814, 1816, 1822, 1831, 1846. Ireland. The poor suffered greatly because of failure of the potato. In 1847, parliament voted $50,000,000 to relieve the suffering of the people.
1837–8. North-western India; above 800,000 perished.
1860–1. North-western India; thousands perished.
1865–6. Bengal and Orissa; about 1,000,000 perished.
1868–9. Rajpootana, etc.; about 1,500,000 perished.
1871–2. Persia; very severe.
1874. Bengal; caused by drought.
1874–5. Asia Minor.
1877. Bombay, Madras, Mysore, etc.; about 500,000 perished.
1877–8. Northern China; very severe.

[Compiled from *Encyclopædia Britannica*, 9th ed.]

FAN, an instrument or mechanical contrivance for moving the air for the sake of coolness, or for winnowing chaff from grain. In the east, the use of fans is of remote antiquity. The Hebrews, Egyptians, Chinese, and the miscellaneous population of India, all used fans as far back as history reaches. At the present day, it is customary, in the better classes of houses in India, to suspend a large species of F. from the ceiling, and keep it in agitation with strings, pulled by servants, in order to give a degree of coolness to the air. See PUNKAH. Among the oldest notices of winnowing fans are those in the Scriptures. There the F. is always spoken of as an instrument for driving away chaff, or for cleansing in a metaphorical sense; and such notices remind us of the simple processes of husbandry employed by a people little advanced in the arts. It was a long stride from the use of a simple hand-instrument for winnowing to that of the modern mechanism employed for a similar purpose. See FANNERS; BLOWING MACHINES.

As is observable from the collection of Egyptian antiquities in the British museum, the F. as an article of female taste and luxury is of quite as old date as the instrument is for commoner purposes. Terence, a writer of Latin comedies, who lived in the 2d c. B.C., makes one of his characters speak of the F. as used by ladies in ancient Rome: *Cape hoc flabellum, et ventulum huic facito*—"Take this fan, and give her thus a little air." From this Roman origin, the fashion of carrying fans could scarcely fail to be handed down to the ladies of Italy, Spain, and France, whence it was in advanced times imported by the fair of Great Britain. Queen Elizabeth, when in full dress, carried a fan. Shakespeare speaks of fans as connected with a lady's "bravery" or finery:

> With scarfs and fans, and double charge of bravery.

It is proper to say, however, that the F. was in these and also in later times not a mere article of finery. There were walking as well as dress fans. The walking or outdoor F. which a lady carried with her to church, or to public promenades, was of large dimensions, sufficient to screen the face from the sun, and answered the purpose of the modern parasol (q.v.). In old prints, ladies are seen carrying these fans in different attitudes according to fancy. The dress F., which formed part of a lady's equipment at court ceremonies, drums, routs, and theatrical entertainments, was of a size considerably less than the walking F., and altogether more elegant. Of these dress fans there exist numerous specimens bequeathed as heirlooms from one generation to another; indeed, there are few ladies who cannot show several of different eras throughout the 18th c.; some being in good preservation, while in others the gilded stars and cupids which delighted the eyes of great-grandmothers have a mournfully tarnished appearance. In the finer kinds of these old fans, the open part of paper is painted with pretty rural scenes and groups of figures in the style of Watteau (q.v.). All were probably of French manufacture. The more costly F. imported from China was, and still is, altogether of ivory, highly carved and pierced; but it wants the lightness and flexibility which were essential in the ordinary management of this article of the toilet. Strictly speaking, the F. was used less for the purpose of cooling than for giving the hands something to do, and also for symbolically expressing certain passing feelings. In the hand of an adept, the F., by peculiar movements, could be made to express love, disdain, modesty, hope, anger, and other emotions. Gay, speaking of Flavia's accomplishments, says:

> In other hands, the fan would prove
> An engine of small force in love.

Considering the coarseness of language, even in the higher circles, in the early part of the 18th c., we cannot wonder that the F. should have been indispensable to a lady going into company. It was held up to shield the countenance when anything too shocking for female ears was uttered. Pope has an allusion to this use of the fan:

> The modest fan was lifted up no more,
> And virgins smiled at what they blushed before.

Steele, in a paper in the *Tatler*, No. 52, Aug. 9, 1709, gives an amusing account of Delamira, a fine lady, resigning her F. when she was about to be married. One of her female acquaintances, having envied the manner in which this charming and fortunate coquette had played her F., asks her for it. Delamira acknowledges the wonderful virtues of the F., and tells her that "all she had above the rest of her sex and contemporary beauties was wholly owing to a F. (that was left her by her mother, and had been long in the family), which, whoever had in possession, and used with skill, should command the hearts of all her beholders; 'and since,' said she smiling, 'I have no more to do with extending my conquests or triumphs, I will make you a present of this inestimable rarity.'" Two years later, Addison, in a paper in the *Spectator* (No. 102), gives a humorous account of the tactics of coquettes in the use of fans: "Women are armed with fans as men with swords, and sometimes do more execution with them;" then he goes on to describe how ladies are instructed to handle, discharge, ground, and flutter their fans—the whole being a pleasant satire on the fan-maneuvering in the reign of queen Anne.

Later in the 18th c., fans served another important purpose. At dancing assemblies in London, Bath, and elsewhere, it was usual for the gentlemen to select their partners

by drawing a fan. All the ladies' fans being placed promiscuously in a hat, each gentleman drew one, and the lady to whom it belonged was his allotted partner. Mrs. Montagu, in one of her letters, refers to this custom: "In the afternoon, I went to lord Oxford's ball at Mary-le-bone. It was very agreeable. The parties were chosen by their fans, but with a little *supercherie*." Of the trick or fraud which this authoress delicately veils under a French term, the beaus of that period were far from guiltless. A lady's F. was almost as well known as her face, and it was not difficult, with a little connivance, to know which to draw. At Edinburgh, where it appears to have been the practice to select a partner for a whole season, the fans of the ladies were carefully studied. Sir Alexander Boswell alludes to this species of stratagem in one of his poems:

> Each lady's fan a chosen Damon bore,
> With care selected many a day before;
> For unprovided with a favorite beau,
> The nymph, chagrined, the ball must needs forego.

In Italy, Spain, the West Indies, and also some parts of the United States, fans are largely in use for giving the sensation of coolness during hot weather, and for this purpose they may sometimes be seen in the hands of gentlemen as well as ladies. In Spain, the old fashion of fan-flirting appears to be still in vogue. A late traveler in that country says: "I was vastly interested in the movements of the ladies' fans at church. All the world knows that Spanish fans are in perpetual motion, and betray each feeling, real or assumed, that passes through the mind of the bearer. I felt convinced I could guess the nature of the service at every particular moment by the way in which the fans were waving. The difference between a litany and a thanksgiving was unmistakable; and I believed that minuter shades of devotion were also discoverable."— *Vacation Tourists* (1861).

With other changes in manners, fans are no longer used in English fashionable circles for the frivolous purposes noticed in their past history; they still continue, however, to form an article of ceremonial dress at dinner and other evening parties. In embellishing them, foreign as well as native art is exerted on a scale commensurate with their price. From the superior kinds, composed of ivory and silk, costing 20 guineas, down to those of wood and paper, which are sold at 6*d.* or 1*s.*, there are varieties to suit every toilet and pocket. Lately, fans made tastefully of feathers, also fans constructed of straw and variously colored ribbons, have been among the novelties of fashion. In the case of a general court mourning, ladies are enjoined to use "black paper fans." The manufacture of fans of various kinds is carried on in England, France, Belgium, Spain, and other European countries, likewise in the United States; and now, as formerly, the F. is an article of export from China to many parts of the world. W. C.

FANAR'IOTS, the general name given to the Greeks inhabiting the Fanar or Fanal in Constantinople, a quarter of the city which takes its name from the beacon (Gr. *phanarion*) situated in it. They first appear in history after the taking of Constantinople by the Turks, and appear to have been originally descendants of such noble Byzantine families as escaped the fury of the barbarians. Afterwards, however, the class was recruited by emigrants from different parts of the old Byzantine empire. Subtle, insinuating, intriguing, they soon took advantage of the ignorance of the Turkish governors, and made themselves politically indispensable to their rulers. They filled the offices of dragomans, secretaries, bankers, etc. One of them, named Panayotaki, at a later period, was appointed dragoman to the divan, and his successors obtained still greater honors. Through their influence, the lucrative office of dragoman of the fleet was called into existence, which gave them almost unlimited power in the islands of the Archipelago. Besides, from them were chosen, until the outbreak of the revolution in 1822, the hospodars of Wallachia and Moldavia, while, in addition, the disposal of most of the civil and military posts under the Turkish government was in their hands. In spite of their power, however, the F. never exhibited much patriotism; they were animated by the petty motives of a caste, and when the war of liberation broke out among their countrymen, they took no part in it. In the present altered state of affairs in Turkey, they have no political influence. See Marco Zalloni's *Essai sur les Fanariots* (Marseilles, 1824; 2d ed. 1830). Consult also Finlay's *History of the Greek Revolution* (Edin., Blackwood & Sons, 1861).

FANCY. See IMAGINATION.

FANDAN'GO, like the *bolero*, is an old Spanish national dance, in three-quarter time. It is danced most gracefully in the country, usually to the accompaniment of a guitar, while the dancers beat time with castanets, a custom borrowed from the Moors. It proceeds gradually from a slow and uniform to the liveliest motion; and notwithstanding the simplicity of the *pas*, vividly expresses all the graduations of the passion of love, in a manner sometimes bordering on licentiousness. The people are so passionately fond of it, that the efforts of the clergy have never been able to suppress it.

FANEUIL, PETER, 1700–43; b. N. Y., of French-Huguenot descent; became a merchant in Boston. He was the builder of Faneuil hall, the pride of old Boston, given to that city by him as a personal donation.

FANEUIL HALL, a spacious public hall in Boston, Mass., erected in 1742 by Peter Faneuil, and presented by him to the town. In its original condition as so gifted, the building contained a hall for public meetings, with lesser apartments above, and a basement used as a market. In 1761, it was destroyed by fire, and rebuilt. During the revolutionary struggle with England, the hall was so often used for important political meetings, that it became known as "the cradle of American liberty." In 1805, the building was increased in height by an additional story, and also increased in width. It is now an edifice about 80 ft. square; the hall contains some fine paintings; and the basement is no longer used as a market.

FANFARE is the French name of a short and lively military air or call, executed on brass instruments. It was brought by the Arabs into Spain, whence it passed into Mexico and the new world. *Fanfaron*, derived from F., is the name given to a swaggering bully or cowardly boaster, probably because of the empty noise he makes when "blowing his own trumpet," or threatening timid people, and the term applied to his idle braggadocia and vaporing vaunts is *fanfaronnade*.

FANG (A.-S. a catching or grasp, from *fon*, to seize; pp. *fangen;* comp. Ger. *fangen*, to catch). In the terminology of the law of Scotland, a thief taken *with the fang* is one apprehended while carrying the stolen goods on his person. It is not very long since this word formed part of the common speech of Scotland:

> "Snap went the shears, then in a wink,
> The *fang* was stowed behind a bink."
> *Morison's Poems*, p. 110.

In England, also, the verb *fang* was still in use in Shakespeare's time: "Destruction *fang* mankind!" (*Timon of Athens*, iv. 3); and "Master Fang," in *Henry IV.*, is named after his office. We still use the phrase "in the fangs," for in the clutches; and the fangs of a dog or of a serpent are its teeth with which it catches or holds.

FANNERS, a machine employed to winnow grain. In passing through the machine, the grain is rapidly agitated in a sieve, and falling through a strong current of wind, created by a rotatory fan, the chaff is blown out at one end, and the cleansed particles fall out at an orifice beneath. The apparatus is composed chiefly of wood, and though ordinarily moved by the hand, it is sometimes connected with the driving power of a thrashing-mill. The F. superseded the old and slow process of winnowing, which consisted in throwing up the grain by means of sieves or shovels, while a current of wind, blowing across the thrashing-floor, carried away the chaff. "A machine for the winnowing of corn was, as far as can be ascertained, for the first time made in this island by Andrew Rodger, a farmer on the estate of Cavers in Roxburghshire, in the year 1737. It was after retiring from his farm to indulge a bent for mechanics, that he entered on this remarkable invention, and began circulating what were called *fanners* throughout the country, which his descendants continued to do for many years."—*Domestic Annals of Scotland*, by R. Chambers, vol. iii. Strangely enough, there was a strong opposition to the use of this useful instrument; the objectors being certain rigid sectaries in Scotland, who saw in it an impious evasion of the division will. To create an artificial wind, was a distinct flying in the face of the text, "He that formeth the mountains, and createth the wind."—Amos iv. 13. Apart from the folly of the objectors, who carried their fancies to the extent of petty persecution, we are amazed at their apparent neglect of the fact, that the winnowing of corn by artificial means, in which fans performed a conspicuous part, is mentioned repeatedly in the Old Testament. See FAN. The advantages in using the F. soon overcame all prejudices on the subject, and the objections to the use of the machine are now remembered only by tradition, and by a passage in one of the imperishable fictions of Scott. In the tale of *Old Mortality*, Mause Headrigg is made anachronously to speak to her mistress about "a newfangled machine for *dighting* the corn frae the chaff, thus impiously thwarting the will o' Divine Providence, by raising wind for your leddyship's use by human art, instead of soliciting it by prayer, or patiently waiting for whatever dispensation of wind Providence was pleased to send upon the shieling-hill."

FANNIÈRE, FRANÇOIS AUGUSTE, and FRANÇOIS JOSEPH, b. the first in 1818, and the other in 1822; French engravers of especial eminence. Their masterpieces are two shields representing incidents from *Orlando Furioso*. Auguste is a member of the legion of honor.

FANNIN, a co. in n. Georgia, on the Tennessee and North Carolina borders; 425 sq.m.; pop. '70, 5,429—114 colored. It has a mountainous surface, and much of it is yet uncultivated. Co. seat Morgantown.

FANNIN, a co. in n.e. Texas on Red river, crossed by the Texas and Pacific railroad; 800 sq.m.; pop. '70, 13,207—2,484 colored. The surface is undulating, the soil fertile, and timber abundant. Co. seat, Bonham.

FANNIN, JAMES W., b. N. C., killed at Goliad, Texas, 1836. Being defeated by a superior force of Mexicans, Fannin and 356 others surrendered as prisoners of war, with the stipulation that they should be treated according to the ordinary rules. Instead of

carrying out the agreement Santa Anna ordered them to be shot, Fannin being the last victim.

FANNING, DAVID, 1756–1825; b. N. C. Having been robbed at the beginning of the revolution, by men who claimed to be whigs, Fanning became a tory, and committed many daring outrages, killing several men who had incurred his enmity. In one case he rushed into a village where a court was in session, and carried off the judge, lawyers, and spectators. Not long afterwards he captured Gov. Burke and his entire suite. When the patriots gained rule he fled to Florida, and from there to St. John, N. B. Here he was a member of the colonial assembly; but his character was developed in many villainies, culminating finally in sentence to death for rape; but he escaped from prison, and was afterwards pardoned.

FANNING, EDMUND, LL.D., 1737–1818; b. Long Island; a graduate of Yale. He was a tory in the revolution, and raised and commanded a regiment in the king's service. After the war he was rewarded with the offices of councilor and lieutenant-governor of Nova Scotia, and governor of Prince Edward's island. He rose to maj.gen. in the British army.

FA'NO (Lat. *Fanum Fortunæ*, so called from the temple of Fortune, which the Romans erected here in commemoration of the defeat of Asdrubal on the Metaurus) is the name of a town and seaport of Italy, in the province of Urbino e Pesaro, finely situated in a beautiful and fertile district, on the shore of the Adriatic, 30 m. n.w. of Ancona, and near the mouth of the Metaurus. It is well built, is surrounded with walls and ditches, has a cathedral dedicated to St. Fortunato, and numerous churches, containing many valuable paintings, among which are several of the best works of Domenichino, and an excellent "Annunciation" by Guido. The remains of a triumphal arch of white marble, raised in honor of Augustus, form perhaps the chief object of classical interest at Fano. Pop. 6,500, who carry on considerable trade in corn and oil, and in silk goods. Here, in 1514, pope Julius II. established the first printing-press with Arabic letters known in Europe. The port of F. was once well known to the traders of the Adriatic; its commerce, however, has declined, and the harbor become, to some extent, choked up with sand.

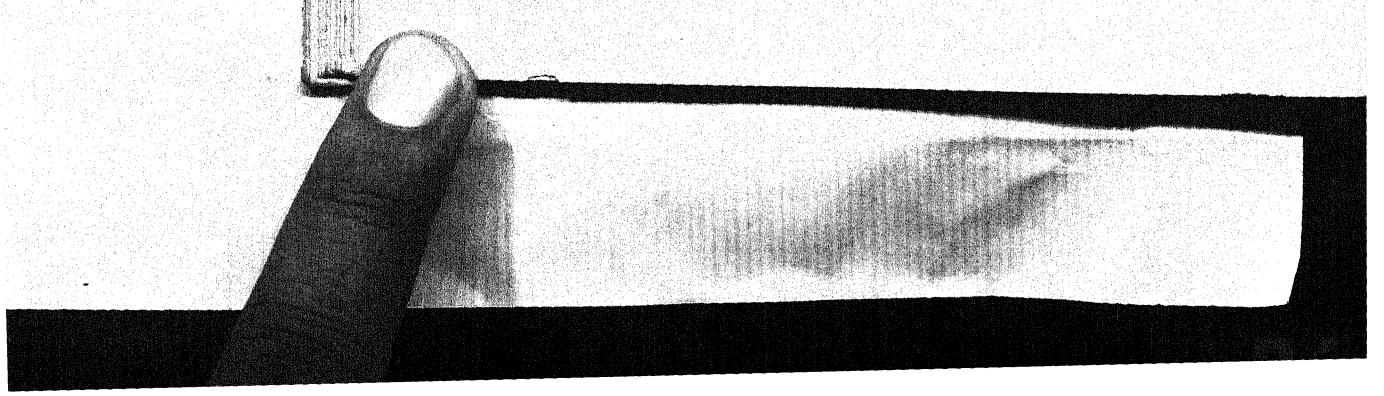
FAN PALM, a name common to all those palms which have fan-shaped leaves, as the species of *mauritia*, *lodoicea* (double cocoa-nut), *hyphæne* (Doum palm), *corypha*, *livistona*, *chamærops*, etc. The only truly European palm, *chamærops humilis* (q.v.), is a F. P., as is also the North American palmetto. The talipot palm (*corypha umbraculifera*) is sometimes called the great fan palm. The Palmyra palm is another fan palm. The fan-shaped leaf is produced by an abbreviation of the midrib of a pinnated leaf.

FANS, THE, a race of aborigines in equatorial Africa, residing on the tributaries of the Gaboon river, and said to be cannibals; the accounts of this savage race are, however, still imperfect, and what is mentioned respecting them wants confirmation.

FANSHAWE, Sir RICHARD, was b. in 1608, at Ware Park, in the co. of Hertford; studied at Jesus college, Cambridge; and in 1626, became a member of the inner temple. On the outbreak of the civil war, he took part with the king; and in 1648, became treasurer to the navy under prince Rupert. He was taken prisoner at the battle of Worcester; and on his release, withdrew to Breda in Holland, where Charles II. was holding his court in exile. After the restoration, he was appointed ambassador at the court of Madrid, where he died, in 1666. F. was an author of considerable reputation. His most celebrated work, now very rare, is a translation of Guarini's *Pastor Fido*, the lyrical passages of which are rendered with remarkable skill and elegance. The volume in which it appeared was published in 1664, and contains other pieces in prose and verse.

FANTA'SIA, in music, the name of a composition of a similar character to the capriccio; also given to extempore effusions performed by a musician who possesses the rare gift of producing, as it were, off-hand music like a well-studied, regular composition. Hummel was more celebrated for his extempore fantasias on the pianoforte than even for his published compositions. Frederick Schneider was equally great for his free fantasias on the organ,

FANTEE, a section of the gold coast of Africa, lying along the gulf of Guinea, now under British protection. The country is well watered, fertile, and populous; the inhabitants belonging to the same family as the Ashantees, but more muscular, remarkably cleanly, and distinguished from other African tribes by small scarifications on the cheeks and back of the neck. They are separated from the Ashantees by a belt of almost untraversed forests, and declaring their independence, controlled about 100 m. of the coast. During a war with the Ashantees in 1807, they secured the aid of the English, but nevertheless were overrun by their enemies. They rebelled, with English help, in 1823, but were again subdued, and the British commander, sir Charles McCarthy, was captured and killed; but in 1823, the Ashantees were driven out of the Fantee territory, and until 1872 the Fantees were unmolested. In that year, the Ashantees complained of the treaty transferring the Dutch coast colonies to the English, and in 1873, the Ashantee king overran the Fantee country, and even threatened Cape Coast castle with a native force of 50,000. He was driven back, however, by sir Garnet Wolseley, in 1874.



FANTOCCI'NI. See PUPPET.

FAN-TRACERY VAULTING, a kind of late Gothic vaulting (15th c.), so called from its resemblance to a fan. The ribs or veins spring from one point, the cap of the shaft, and radiate with the same curvature, and at equal intervals, round the surface of a curved cone or polygon, till they reach 'the semicircular or polygonal ribs which divide the roof horizontally at the ridge level. The spaces between the ribs are filled with foils and cusps, resembling the tracery of a Gothic window; hence the name *fan-tracery.* The spaces between the outlines of the fans at the ridge level, are called by prof. Whewell (*German Churches*) ridge lozenges. In Henry VII.'s chapel, Westminster, one of the best examples of this kind of vaulting, these lozenges are occupied by pendants, which produce a most astonishing effect, looking like arches resting on nothing. They are, however, supported with great ingenuity by internal arches, rising high above the visible vaulting. This is one of the *tours-de-force* which astonish the vulgar, but are only adopted when art has reached a low level, and has in a great measure given place to artifice. Fan-tracery is a very beautiful kind of vaulting, and is peculiar to England, where it originated, and where alone it was practiced. Among the finest examples are Henry VII.'s chapel at Westminster; St. George's, Windsor; and king's college chapel, Cambridge. Fan-tracery is also frequently used in the vaulting of cloisters, as at Canterbury, Chester, etc.

FARAD, in electricity, a unit of quantity. See *Units of the Current Elements* in art, GALVANISM.

FARADAY, MICHAEL, D.C.L., d. 1867, one of the most distinguished chemists and natural philosophers of the present century; a splendid instance of success obtained by patience, perseverance, and genius, over obstacles of birth, education, and fortune. He was born in 1791, near London, his father being a blacksmith. He was early apprenticed to a bookbinder; yet even then he devoted his leisure time to science, and amongst other things, made experiments with an electrical machine of his own construction. Chance having procured him admission, in 1812, to the chemical lectures of sir H. Davy (q.v.), then in the zenith of his fame, he ventured to send to Davy the notes he had taken, with a modest expression of his desire to be employed in some intellectual pursuit. Davy seems to have at first endeavored to discourage him, but finding him thoroughly in earnest, soon engaged him as his assistant at the royal institution. He traveled with Davy to the continent, as assistant and amanuensis. On their return to London, Davy confided to him the performance of certain experiments, which led in his hands to the condensation of gases into liquids by pressure. Here he first showed some of that extraordinary power and fertility which have rendered his name familiar to every one even slightly acquainted with physics, and which led to his appointment, in 1827, to sir H. Davy's post of professor of chemistry in the royal institution. We shall give a brief summary of his more important discoveries and published works, arranging the different subjects according to their position in various branches of science, rather than in their chronological order.

In chemistry, we have his treatise on *Chemical Manipulation,* 1827; 2d ed. 1842, even now a very valuable book of reference. His *Lectures on the Non-metallic Elements,* and *Lectures on the Chemical History of a Candle,* delivered at the royal institution in 1860, were published shortly after. As discoveries or investigations of a high order in this branch of science, we may mention—new compounds of chlorine and carbon, 1821; alloys of steel, 1822; compounds of hydrogen and carbon, 1825; action of sulphuric acid on naphthaline, 1826; decomposition of hydrocarbons by expansion, 1827; and the very valuable series of experiments made in 1829–30, on the manufacture of glass for optical purposes, which resulted in one of his greatest discoveries.

As practical applications of science, his preparation of the lungs for diving, and ventilation of light-house lamps, are conspicuous, as are also his celebrated letter on table-turning, and his lecture on mental education.

To enumerate only the most prominent of his publications on physical science, we may commence with the Condensation of the Gases (already referred to); then we have Limits of Vaporization, Optical Deceptions, Acoustical Figures, Regelation, Relation of Gold and other Metals to Light, and Conservation of Force. Of these, the condensation of gases into liquids and solids, though previously effected by others (and F. has ever been the foremost to acknowledge another's priority), he has really made his own, not only by the extent and accuracy of his experiments, but by the exquisite experimental methods by which he effected the results. His ideas on regelation, and its connection with the motion of glaciers, have not met with universal acceptance, though (see HEAT, ICE, GLACIER) there is no dispute as to his being correct in his *facts.* In regard to conservation of force, there can be no doubt that he has been led into a fallacy, by mistaking the technical use of the word *force* (see FORCE), for in his article on the subject he describes experiments made with the view of proving the conservation of *statical,* not *dynamical* force, whereas the doctrine of conservation asserts merely the conservation of "energy," which is *not* statical force. He *may* be right also, but if so, it will be by a new discovery, having no connection whatever with "conservation of energy."

His Christmas lectures at the royal institution, though professedly addressed to the

young, contain in reality much that may well be pondered by the old. His manner, his unvarying success in illustration, and his felicitous choice of expression, though the subjects were often of the most abstruse nature, were such as to charm and attract all classes of hearers. Besides two sets (already mentioned) on chemical subjects, we have his *Lectures on the Physical Forces*, a simple work, but in reality most profound, even in its slightest remarks.

But the great work of his life is the series of *Experimental Researches on Electricity*, published in the *Philosophical Transactions* during the last forty years and more. Fully to understand all the discoveries contained in that extraordinary set of papers, would require a knowledge of all that has been discovered during that time as to electricity, magnetism, electro-magnetism, and diamagnetism. We may merely mention the following, almost all of which are discoveries of the *first* order. They are given in the order of publication, which is nearly that of discovery: 1. Induced Electricity, 1831, comprehending and explaining a vast variety of phenomena, some of which have already been applied in practice (especially as magneto-electricity) to light-houses, electro-plating, firing of mines, telegraphy, and medical purposes. Electric currents derived from the earth's magnetism. 2. The Electro-tonic State of Matter, 1831; 3. Identity of Electricity from Different Sources, 1833; 4. Equivalents in Electro-chemical Decomposition, 1834; 5. Electro-static Induction—Specific Inductive Capacity, 1838; 6. Relation of Electric and Magnetic Forces, 1838; 7. The Electricity of the Gymnotus, 1839; 8. Hydro-electricity, 1843; 9. Magnetic Rotatory Polarization, 1846; 10. Diamagnetism and the Magnetic Condition of *all* Matter, 1846; 11. Polarity of Diamagnetics, and the Relation of Diamagnetism to Crystalline Forces, 1849; 12. Relation of Gravity to Electricity, 1851. This, as before remarked, is F.'s attempt to prove a conservation of *statical* force. 13. Atmospheric Magnetism, 1851. An attempt to explain the diurnal changes of the earth's magnetic force by the solar effect on the oxygen of the air; a very interesting paper.

F., who had received a pension in 1835, was in 1858 appointed a house in Hampton court. In 1862, he gave his last discourse on "gas-furnaces;" and advocated the use of magneto-electric light in light-houses. In 1865, he resigned the position of adviser to the Trinity house, also that of director of the laboratory of the royal institution. See *Life of Faraday*, by Tyndall (1869); and by Bence Jones (2 vols. 1870).

FARADIZATION. See ELECTRICITY, MEDICAL, *ante*.

FARALLO'NE ISLANDS, a group of small islands off the coast of California, the nearest one 32 m. w. of the entrance to San Francisco bay. They lie parallel with the coast, and their extreme points are about 12 m. apart. On the s. Farallone is an important light-house. These islands are the resort of myriads of sea-fowl, gulls, and murres, whence eggs are carried, in great quantities, to the San Francisco market by a company which owns the islands.

FARCE, a dramatic piece of a low comic character. The difference between it and comedy proper is one of degree, and not of kind. The aim of both is to excite mirth; but while the former does so by a comparatively faithful adherence to nature and truth, the latter assumes to itself a much greater license, and does not scruple to make use of any extravagance or improbability that may serve its purpose. It does not, therefore, exhibit, in general, a refined wit or humor, but contents itself with grotesque rencontres, and dialogues provocative of fun and jollity. The name is differently explained. In any case, it comes originally from the Latin *farcire*, to stuff; but while Adelung says that, in the middle ages, *farce* signified in Germany certain songs, which were sung between the prayers during divine service, others derive it from the Italian *farsa*, this from the Latin *farsum* (stuffed); while Paolo Bernardi states that it comes from a Provençal word *farsum*, meaning a *ragout*, or mess of different ingredients, an opinion which has this to say for itself, that the *dramatis personæ*, *Jack-pudding*, etc., were generally named after special dishes or mixtures. The first farces are said to have been composed by the society of the *Clercs de Bazoche* in Paris, about the year 1400, as a contrast to the ecclesiastical plays performed by the religious orders. The most widely celebrated and the oldest is the *Farce de Maître Pierre Pathelin*, which some consider to be a composition of the 13th c., but which was more probably executed by one Peter Blanchet, about 1480. Subsequently, Molière elevated and refined the farce into pure comedy, in his *Médecin Malgré lui*, *Malade Imaginaire*, *Les Fourberies de Scapin*, and other inimitable productions. In England, the origin of the modern F. dates from about the commencement of the 18th century. It then began to be regarded as something distinct from comedy proper, and to constitute a special theatrical entertainment. Of all the numerous farces which have been performed before English audiences, only those of Samuel Foote have kept a place in literature.

FARCY in horses depends upon the same causes as glanders (q.v.), which it usually precedes and accompanies. The absorbent glands and vessels, usually of one or both hind-limbs, are inflamed, tender, swollen, hard, and knotted. The vitiated lymph thus poured out softens, and ulcers or F. buds appear. Unlike the ulcers of glanders, they are curable, but require time and care. They must be scarified with the hot iron, which, to prevent their spreading, may also be gently run over the adjacent sound skin. Good

feeding and comfortable lodgings are essential, and if they do not interfere with the appetite, give tonics, such as a dram each of sulphate of copper and iodine, repeated twice a day.

FARDEL-BOUND, a disease of cattle and sheep, consists of impaction of the fardel bag, or third stomach, with food, which is taken in between the leaves of this globular stomach, there to be fully softened and reduced. When the food is unusually tough, dry, or indigestible, consisting, for example, of overripe clover, vetches, or rye-grass, the stomach cannot moisten and reduce it with sufficient rapidity; fresh quantities continue to be taken up, until the overgorged organ becomes paralyzed, its secretions dried up, and its leaves affected with chronic inflammation. The slighter cases so common amongst stall-fed cattle are "loss of cud," indigestion, and torpidity of the bowels. In severer form there is also fever, grunting, swelling up of the first stomach, and sometimes stupor or epilepsy. The overgorged stomach can, moreover, be felt by pressing the closed fist upwards and backwards underneath the false ribs on the right side. The symptoms often extend over ten days or a fortnight. Purgatives and stimulants are to be given. For a full-grown beast, give, in 3 or 4 bottles of water or thin gruel, ½ lb. each of common and Epsom salt, 15 ground croton beans, a dram of calomel, and 2 oz. of ginger. If no effect is produced, repeat this in 12 or 15 hours. Inject soap-and-water clysters every hour, withhold all solid food, and allow only sloppy mashes, treacle and water, or thin linseed tea. An occasional bottle of ale, with an ounce or two of ginger, often expedites the action of the physic, and wards off nausea and stupor.

FAREHAM, a market-t. and sea-bathing place in the s. of Hampshire, on a creek at the n.w. end of Portsmouth harbor, 12 m. e.s.e. of Southampton, and 9 m. n.n.w. of Portsmouth. It has manufactures of earthenware. Pop. '71, 7,023.

FAREL, GUILLAUME, one of the most active promoters of the reformation in Switzerland, was b. in the year 1489 in Dauphiné. He studied at Paris, and was at first distinguished by his extravagant zeal for the practices of the Catholic church. "Truly," says he in one of his letters, "the papacy itself was not so papistical as my heart." Intercourse with the Waldenses, and with his friend Lefevre d'Etaples, induced him to study the Scriptures; the result was his conversion to Protestantism, and F., who was by nature vehement even to indiscretion, immediately commenced to proselytize. The chief scene of his labors was France and Switzerland. At Basel, 15th Feb., 1524, he opened his career of controversy and evangelization by publicly sustaining 30 theses on the points in dispute between Roman Catholicism and Protestantism. In less than two months, he was compelled to leave, mainly on account of a quarrel between himself and Erasmus, whom, on account of his moderate or trimming policy, F. had compared to Balaam. F. next went to Strasburg, and afterwards to Montbeliard, where his iconoclastic way of preaching the gospel excited the alarm of his friends, several of whom, Œcolampadius among others, censured him sharply for his violence. His zeal was next manifested in the canton of Bern. It was also chiefly through his exertions that the towns of Aigle, Bex, Olon, Morat, and Neuchâtel followed the example of Bern in embracing the reformation. In 1532, he went to Geneva, where his success was at first so great, that on account of the agitation excited, he had to leave the city. He returned in 1533, was again compelled to withdraw, but once more entered it in 1534. This was his year of triumph; the reformers filled the churches, and the Catholic clergy, who had made themselves odious to the citizens by abetting the despotic schemes of the duke of Savoy, retired to Lausanne and Fribourg. In Aug., 1535, the town council of Geneva formally proclaimed the reformation. F., however, was a missionary, not a legislator, and the organization of the Genevan church passed into the hands of Calvin (q.v.). The severity of the new ecclesiastical discipline produced a reaction, and in April, 1538, the two reformers were expelled from the city. F. took up his residence at Neuchâtel, where the reformed church was in a state of deplorable disorder. He composed its differences, and drew up a constitution, which it accepted, after long and stormy debates, in 1542. In Sept. of the same year, we find him fighting the battle of the reformation at Metz. After his return to Neuchâtel, he frequently visited Calvin, whose authority in Geneva had been completely restored. It was on one of these occasions that he was present at the burning of Servetus, and though not, comparatively speaking, a bigoted Calvinist, he allowed his orthodoxy on that occasion to choke his humanity, exclaiming, as the unhappy heretic uttered his last prayer to God from the flames: "See what power the devil has over one who has fallen into his hands." In 1557, along with Beza, he was sent to the Protestant princes of Germany, to implore their aid for the Waldenses, and on his return—inexhaustible in his activity—he sought a new sphere of evangelistic labor in the regions of the Jura mountains. When trembling upon threescore-and-ten, he married a young wife, very much to Calvin's disgust, who sarcastically speaks of him under the circumstances as "our poor brother." But neither his newly formed domestic ties, nor the infirmities of age, could quench his missionary zeal. In 1560–61, he proceeded to his native Dauphiné, and passed several months at Gap, preaching against Catholicism with all the ardor of his youth. In Nov., 1561, he was thrown into prison, but was shortly after rescued by his friends. In 1564, he paid a visit to the dying Calvin; his strength, however, was now nearly exhausted, and on the 13th Sept., 1565, he expired at Neuchâtel, leaving a son

named Jean, who survived him only three years. F. was a man of extensive scholarship, and wrote largely, but his works very inadequately represent the genius of the man. Compare Kirchhofer's *Das Leben Wilhelm Farels* (2 vols., Zurich, 1831–33), and C. Schmidt's *Etudes sur Farel* (Strasburg, 1834); also his *Wilhelm F. und Peter Viret* (1860).

FAREWELL, CAPE, the southern extremity of Greenland, lies in lat. 59° 49′ n., and long. 43° 54′ west. It is generally beset with ice, which, according to recent authorities, appears to come from the n.e., and to sweep round into Davis' strait. Hence it is but little known; and, in fact, the Danish traders, in passing to and from the settlements on West Greenland, seem uniformly to maintain an offing of more than 100 miles.

FARI'A Y SOUSA, MANOEL, a Portuguese historian and poet, was b. of an ancient family at Caravella, in the province of Entre Minho e Douro, 18th Mar., 1590, and studied at the university of Braga. For some time he was in the service of the bishop of Oporto, but shortly after 1613 he went to Madrid, where, however, he did not long remain, as he found no opportunity there of improving his circumstances. In 1631, he obtained the office of secretary to the Spanish embassy at Rome, where his extensive acquirements procured him the notice of pope Urban VIII. and of all the learned men of the city. After some time, he returned to Spain, and died at Madrid 3d June, 1649. Faria's writings are partly in Spanish, and partly in Portuguese. Of the former, we may mention *Discursos morales y politicos* (2 vols., Madr. 1623–26), *Epitome de las Historias Portuguesas* (Madr. 1628), *Comentarios sobre la Lusiada* (2 vols., Madr. 1639), *Asia Portuguesa* (3 vols., Lisbon, 1666–75), *Europa Portuguesa* (3 vols., Lisbon, 1678–80), *Africa Portuguesa* (Lisbon, 1681), and the greater portion of his poems, which he collected under the title of *Fuente de Aganippe o Rimas Varias* (Madr. 1644–46). These poems consist of sonnets, eclogues, canzones, and madrigals. Faria, however, composed about 200 sonnets and 12 eclogues in the Portuguese language; and it is mainly by these, and also by three theoretical treatises on poetry, that he has influenced the development of the poetic literature of Portugal, in which he was long regarded as an oracle. His poetry exhibits talent and spirit, but is on the whole tasteless and bombastic. Faria is not to be confounded with another Portuguese author of the same name, who was born at Lisbon in 1581, and died at Evora in 1655, and who was one of the most learned numismatists of his age.

FARIBAULT, a co. in s. Minnesota on the Iowa border, traversed by Mankato river, and the Southern Minnesota railroad; 720 sq.m.; pop. 75, 11,131. Surface undulating, and soil fertile, producing wheat, corn, butter, etc. Co. seat, Blue Earth City.

FARIBAULT, the seat of justice of Rice co., Minn., on Cannon river, and the Chicago, Milwaukee, and St. Paul railroad, 53 m. s. of St. Paul; pop. '75, 5,525. It has a fine court-house, a Roman Catholic academy, and convent, the Seabury divinity school, the Shattuck school, and a number of manufactories.

FARIDPUR, or FURREEDPORE, a district of British India in the Dacca division of Bengal, bounded n. and e. by the Ganges, w. by the Chandná and Madhumati, and s. by the Bákaganj; 1506 sq.m.; pop. '72, 1,012,589, of whom 588,299 were Mohammedans, and 420,988 Hindus. The district is flat in the s., but higher in the n., and a great portion is subject to inundation. The villages are built on artificially raised sites, or the higher banks of the streams. The climate is damp, the average annual rain-fall being 85½ in., and the mean temperature 77°. The chief rivers are the Ganges, the Arial Khar, and the Madhumati, which are navigable. Rice is the great crop; others are wheat, barley, oats, corn, oil-seeds, beans, sugar-cane, betel-leaf, date-palms, and indigo. More than half the cultivated surface is sown with rice. Three railroads intersect the district.

FARI'NA is the term used by many writers on bees, instead of *pollen*, to denote the pollen of flowers collected by bees for feeding their larvæ. See BEE.

FARI'NA, a Latin term for meal or flour, which has been adopted into the English and other languages, and is very frequently employed both in scientific and popular works. The term F. is also frequently extended to many substances which agree with the meal of the corn-plants or cerealia (q.v.) in containing much starch, and food made of such substances is often called *farinaceous*, its qualities more or less resembling those of the food derived from the cerealia. Of the different kinds of F., those produced by mere trituration of the seeds of grasses (corn), hold the first place for importance and usefulness. Most similar to them are those obtained in the same manner from certain other seeds. See CEREALIA. The F. of the different kinds of pulse (q.v.), or seeds of leguminous plants, has considerably different properties. For the qualities, chemistry, commercial importance, etc., of the different kinds of meal, see MEAL. Other farinaceous substances, consisting chiefly of starch, are obtained from roots—often from tubers—of plants of very different natural orders; some kinds also, as sago, from stems. Cassava meal, which contains, along with starch, much vegetable fiber and protein or albuminous substances, is commonly called F. (*farinha*) in many parts of South America, where it is a principal article of food.

Fossil farina, mountain milk, or *agaric mineral,* is a deposit of silicified animalcules,

obtained from China, etc. In 100 parts, it consists of silica 50½, alumina 26½, magnesia 9, water and organic matter 13, with traces of lime and oxide of iron.

FARINELLI (real name CARLO BROSCHI), 1705–82; b. Naples; a remarkable soprano singer, whose voice was of unequaled compass, possessing seven or eight notes more than those of ordinary vocalists. His career was one of unbroken triumph. In Spain his voice was used by the queen to cure Philip V. of his melancholy mania, and he acquired such influence over the king as to be in power, if not in name, the real prime minister. Night after night he sang to Philip the same six songs, never varying the programme. Through his influence the Italian opera was established in Madrid.

FARI'NI, CARLO LUIGI, an Italian author and statesman, was b. in 1822, at Russi, in Ravenna, in the n. of Italy. Having, with great success, studied medicine at Bologna, F. first became known by several publications belonging to the science of medicine, and soon afterwards by contributions to various scientific periodicals. In 1841 and 1842, having mixed himself up with politics, he was obliged to leave the Roman states, and change his residence repeatedly, until he finally settled at Turin. The amnesty following shortly upon the accession of Pio Nono, opened to F. not only his native country, but also a new career, through the liberal system inaugurated by the supreme pontiff. In 1847, he was called into the reformed ministry, as a substitute to the home secretary; in 1848, he was present in the suite of Carlo Alberto at Volta, and after the flight of the king, protested against the proclaiming of a republic. During the short ministry of the unfortunate Rossi (q.v.), F. was director-gen. of the sanitary and prison department at Rome, from which post, however, he retired as soon as the reaction under Antonelli began to be established. Upon the occupation of Rome by the French, F. became once more an exile, but for a short time only, for in Piedmont he found a home as well as public honors. In 1850, he held the seat of minister of public instruction in the cabinet of Victor Emmanuel II., and on retiring from office, was named a member of the supreme council. When Central Italy resolved to annex itself to the kingdom of Victor Emmanuel, by means of universal suffrage, it was F. who directed the popular mind with such admirable success that, on the day of ballot, not one vote was delivered asking for a separate kingdom. As governor of Central Italy, he showed an undaunted courage against the threats of Austria, and exhibited a thoroughly consistent moderation against the unruly promptings of the Mazzinians. The same qualities accompanied his measures when the newly acquired kingdom of Naples was to be reorganized. In 1861, F. became minister of commerce and public works. In 1862, he took office as president of the cabinet, which he resigned in 1863. He died in 1866. It has been said that "Farini was the mind of Italy, as Garibaldi was its sword." Among his literary productions may be mentioned, *Il Stato Romano* (The Roman State), translated into English under the superintendence of the right Hon. W. E. Gladstone (London, 4 vols., 1859); *Storia d'Italia* (History of Italy), a continuation of Botta's celebrated work. F. was also a contributor to count Cavour's *Risorgimento.*

FARIS ECCHIDIAK, an Arab poet and *littérateur,* was b. about the year 1796. In religion, he is a Syrian Christian. He studied at Cairo, under the ulamas of the mosque of El-Azhar, and in 1836 procured for M. Fresnel some very valuable commentaries upon the poem of *Shanfara.* He was afterwards invited to Malta by an English missionary society, who wanted his services in their oriental printing establishment. The dedication of a poem to the bey of Tunis about 1847, induced that monarch to send a war-vessel to Malta, for the purpose of bringing F. to Tunis, where the poet obtained a distinguished reception, and many rich presents. Subsequently, he went to England, where he was employed in revising the text of a translation of the Bible into Arabic, by the society for the propagation of the Scriptures. In 1851, he published in London the New Testament in Arabic. He subsequently resided in France for a considerable time, and published there, along with M. G. Dugat, in 1854, a French grammar in his native tongue for the use of the Kabyles of Algeria. His principal work is entitled *La Vie et les Aventures de Fariak* (Paris, 1855); it contains a narrative of his own travels, with critical observations on the Arabs and other peoples whom he visited. Some of his own poems are also interspersed. F. returned to London the year before the publication of this work. On the outbreak of the Crimean war, the sultan appointed him one of his dragomans or interpreters, but he has never discharged the duties of his office. F. is said to possess in manuscript a collection of poems, called *The Divan,* which are highly spoken of by those who have seen them.

FARLEY, MICHAEL, 1719–89; b. Mass.; a revolutionary leader; member of the general court; delegate to the provincial congress; member of the executive council, and delegate to the convention for framing the U. S. constitution.

FARM (of uncertain derivation), the term usually employed in Britain to signify a piece of land, either in pasture or in cultivation, held in lease by a tenant from the proprietor. In the United States, the term farmer is often applied to a person who owns as well as cultivates land. The tenure on which land is held by farmers varies in different countries. In some parts of continental Europe, the farmer hires the land on the principle of a kind of partnership with the proprietor. See METAYER. In England,

much of the land is let for a certain annual rent, and mostly either by a yearly term, or at the good-will of the landlord. Leases of different durations have latterly been introduced. In Scotland, the process of land-letting is on a footing which has been advantageous for tenant and proprietor, and has served the best interests of agriculture. The greatly altered and improved system of husbandry of the last half-score years or so, demands something more for successful agriculture than the provisions of the ordinary lease contain. Under the Scotch 19-years lease, the farmer is encouraged to starve the land towards the close of the period of contract, in order to recoup himself as far as possible for his outlays in the shape of manure, by the expiry of the lease, should he have to quit the holding then. The practical result of this is that the land is in a fully productive state about half the duration of the lease. The vastly increased expenditure connected with farming, and the growing and already great necessity for the most being made of the limited land resources of this country, call for more security to the tenant's capital than the lease provides. A strong desire has therefore lately sprung up in Scotland and England for compensation to outgoing tenants for permanent improvements, and even unexhausted manures. This is as much a tenant's as a landlord's question, as it will require more capital to enter a farm than is presently needed. The landlord presumably provides the houses for the farms, but the higher farming of recent years having rendered the former supply of buildings insufficient, considerable difficulty is experienced in obtaining proper house accommodation on many farms, on estates where the landlord's capital happens to be locked up by the keys of entail.

The method of paying rent for farms in Scotland is not uniform. In some districts the annual rent is a fixed sum; but in others, such as the Lothians and best wheat-growing districts, it is a common practice to pay partly a fixed sum, and to leave another portion to be paid in grain, or rather the money value of so much grain according to the average market prices each year, as determined by a jury in every county. See Fiars. This last plan is not so popular as it once was, and most farmers now prefer to pay a fixed sum. In whatever manner the rent is adjusted, it is stipulated to be paid, as nearly as possible, in two equal portions, at Whitsunday (May 15) and Martinmas (Nov. 11), but in practice many of the landlords give three months' credit on each occasion—the Whitsunday rent being exigible at Lammas (Aug. 4), and the Martinmas rent at Candlemas (Feb. 2). At all times, however, the landlord has a right of hypothec (q.v.) over the crops, and can take measures to avoid being defrauded of his proper claims. Usually good feeling subsists between landlord and tenant.

The landlord commonly binds his tenant to farm or cultivate the land according to the most approved systems in use in the district. Such a course may be necessary in some cases to prevent the abuses that might arise from negligence or ignorance; but the restrictions have often been carried too far, and have formed barriers in the way of improvements. So far as regards mere cropping, it would not be much amiss, however, on most arable farms, to forbid more than one half of the land being in white crops during the last four years of the lease. Green crops prevent the land being overrun with weeds. It is perhaps not superfluous to observe here that leases should be written in clear and concise language, and as far removed from ambiguity as possible. There is much need of more simplicity and brevity in the agricultural lease.

The size of farms is regulated by many circumstances. On land adapted for green cropping, and remote from towns, large farms form good subjects for capitalists, and consequently prevail. Stiff clay soils are rather against extensive culture. Where crops are grown that require much hand-labor, farms become small in size. Flax, rape, vines, and market-garden produce all tend to lessen the size of farms. In new countries, too, where there is no slave labor, farms are mostly small. To the discomfiture of many a family, the custom was in Scotland, some twenty years ago, to enlarge the arable farms by grouping two or three into one. Bad on principle, however, this system has had its day, and the tendency of affairs is now if anything in the opposite direction. Grazing farms, whether in the Highlands or Australia, form good outlets for large capitalists.

Under the modern system of farming in Britain, from £12 to £18 of capital per acre is required to farm arable land; and if a heavy live-stock is kept, more capital is required. The rent of Highland grazing varies from 1*s.* 6*d.* to 6*s.* a head for each sheep kept; the value of each sheep being from £1 to £3, according to the kind and age of the stock.

The profits of farming fluctuate quite as much as those of any other trade. Strict personal superintendence is one of the first requisites of success. Without this, the details will be neglected, and loss will ensue. Ten per cent on the capital invested is a good return, but very few have so much. For several years back many farmers have lost money, while few have exceeded 3 per cent profit on the capital invested. Better times, however, appear in store for the farmer. Skill and attention are the qualities which command success in farming as in other things.

A farmer necessarily possesses large numbers of animals—horses, cattle, sheep, pigs, and poultry. These have all to be reared and tended, and demand no little care and

experience. Proper seeds must be selected; and the proper cultivation of the land for the different crops necessitates a succession of processes which require to be attended to. These, however, will be taken up under their respective heads.

FARM BUILDINGS. Each farm must possess a residence for the farmer, cottages for the servants, and buildings for the stock and crop. The *farm-house* should be commodious and plain, and of considerable extent. The cottages for the servants should also be plain and roomy, and internal convenience should be more studied than outward ornament. A strong feeling is arising on this subject in Scotland, and a bill is now before parliament with the view of providing better cottage accommodation.

Proper offices are essential to the economical disposing of the produce of the farm. The corn crops are usually thrashed there, and a large portion of the green crops is consumed by stock, which must be well provided with shelter from the cold. When few turnips were raised, and few cattle fed, large open courts were best suited for converting the straw into manure. Now, however, in many cases, the excrements of the stock are sufficient for wetting all the straw, and hence has arisen the practice of feeding in covered courts and in boxes. In this case, the solid and liquid excrements are carted out along with the straw, which acts the part of a sponge. This is no doubt an excellent way of manufacturing home-made manure; it takes a considerable quantity of straw, however; and as more green crops are raised and consumed on the farm, sufficient straw cannot always be got to absorb all the liquid; hence, a saving of the straw is effected by stall-feeding, when the excess of liquid must be collected into tanks, and otherwise disposed of. When it is remembered that ammonia cannot be purchased in the market at the present time under £80 per ton, and that liquid manure contains a high percentage of ammonia, the utility of husbanding this material must be very evident. Liquid manures should be absorbed by moss or soil, or be carted out, and distributed by pipes, when the plants are in a growing state, otherwise part will be washed out of the soil. Covered farm-yards are rapidly extending over the country. It is the cheapest and best way of erecting farm-offices. On some estates, new steadings have been erected on a too extravagant plan for the size and requirements of the farm. This is simply a burden on the holding. Landlords should not stick so rigidly to a uniform plan of steading, irrespective of the extent and necessities of the different occupancies. In a design for a "farm steading," commended by the judges of the Berwick cattle-show in 1854, the steading is on the covered principle, all the various departments being under one roof. The food-preparing houses are ranged as convenient as possible to those in which the food is to be consumed, and the relative positions of every other department have been carefully studied. This is to be attended to in the formation of all homesteads.

Ventilation.—Without good ventilation, a covered homestead must be a nuisance. All the apartments are so arranged that, unless fresh air circulate through them, and they are kept perfectly clean, there must constantly be unwholesome effluvia in the interior—the foulness of one apartment being communicated to another. The system of ventilating this farmstead is certain to give most satisfactory results, if only ordinary care be taken to keep the different houses as clean as they ought to be. The arrangements are briefly as follows:

Under each feeding-passage is built a circular air-shaft, 30 in. in diameter; in connection with these there are feeding-mouths with gratings on the outside of the building; inside, there are numerous finely perforated gratings; by sliding-valves, wrought by a cord and pulley, the supply of air is regulated. Besides these, there are gratings every 10 or 12 ft. along the exterior walls, perforated so as to admit near the floor a considerable quantity of air. The roof, too, is provided with ventilators with vertical spars, and openings are left here and there in the sarking, to act as induction and eduction tubes. The numerous perforated apertures throughout the building will admit twice the quantity of air required for the respiration of the animals, and are so under command that they will neither admit flies in summer, nor too large a supply of cold air in winter. A covered steading, somewhat similar in construction to the above, has been erected at Glen, in Peeblesshire, where the ventilation of the inclosed cattle-courts, etc., is admirable, and within the last few years considerable numbers of courts have been covered with decided advantages.

To carry out this principle of ventilation is somewhat expensive. A cheap and yet efficient system of ventilation for cattle is to cover the yards with pan-tiles without plaster or lath. Those who wish to see farm-offices economically erected, at the same time combined with the most perfect ventilation, we would recommend to visit some on the property of lord Kinnaird, Rossie Priory, Perthshire. For further information, see *The Book of Farm Buildings*, by Henry Stephens, F.R.S.E., and R. Scott Burn (Edin., Blackwood & Sons, 3d ed., 1871).

FARMER, Hugh, 1714–87; an English theologian, a pupil of Dr. Doddridge. Among his works are *An Inquiry into the Nature and Design of our Lord's Temptation in the Wilderness; Dissertation on Miracles, designed to show that they are Arguments of a Divine Interposition, and Absolute Proofs of the Mission and Doctrine of a Prophet;* and *The General Prevalence of the Worship of Human Spirits in the Ancient Heathen Nations Asserted and Proved.*

FARMER, JOHN, 1789–1838; b. Mass.; especially devoted to genealogy. In 1829 he published a *Genealogical Register* which it was thought contained the names of nearly all the first European settlers in New England. A new edition with many additions was issued in 1862. He edited Belknap's *History of New Hampshire*, to which he added many valuable notes.

FARMER, RICHARD, D.D., a well-known scholar of the last century, was b. at Leicester, Aug. 28, 1735, and was entered a pensioner of Emmanuel college, Cambridge, in 1753. In 1760, he took his degree of M.A., and was appointed classical tutor of his own college. It is not known when he took orders, but, while he held the office of tutor, he acted as curate at Swavesey, a village 8 m. from Cambridge. In 1766, he published his once famous *Essay on the Learning of Shakespeare* (reprinted in 1789 and in 1821), the purpose of which was to show the sources whence the great dramatist derived his knowledge of the ancients. F. proved that it was from translations, and that Shakespeare has often cited the phraseology, and even the errors, of the translators. In 1775, he was elected to the mastership of Emmanuel college, and in 1778, chief-librarian of the university. In 1780, he obtained a prebendal stall at Lichfield, but in 1788, resigned it for the office of canon residentiary of St. Paul's. He died Sept. 8, 1797.

FARMERS-GENERAL (Fr. *fermiers-généraux*) was the name given before the revolution of 1789 to the members of a privileged association in France, who farmed or leased the public revenues of the nation. This peculiar system of tax-gathering dates from an ancient period. For each class of imposts there was a special administrative board, presided over by one of the farmers-general, or by one of his assistants. At first, the leasing of the public revenues was based on the competitive system, and determined by the estimates handed it; but latterly, every formality, every preliminary guarantee of this nature disappeared, and the leasing wholly depended on the favor or jobbery of the government officials. The minister of finance selected the farmers-general at his pleasure, but his choice was always regulated by the present, or rather bribe (*pot-de-vin*) offered to him; and which, we may presume, was never inconsiderable, inasmuch as its value was fixed by the minister himself. Generally, shares in the concern were assigned by the king to his favorites, male and female. The number of farmers-general was ordinarily 40, but shortly before the revolution it had risen to 60. The lease was signed by a salaried deputy, who was responsible to the king alone. The king occupied the position of a creditor towards the farmers-general, and could coerce them into payment of the stipulated sum as a just debt; the farmers-general, on the other hand, occupied a similar position towards their subordinates. The entire sum which it was necessary to place in the national treasury—or, in other words, the annual national revenues—amounted to 180 millions of livres. The rest was enormous profit, for we are certainly within the mark in estimating it at seven million of livres. The powers, rights, and duties of the farmers-general were defined by special decree; but however severe may have been the fiscal laws against fraud and contraband, it is notorious that, shortly before the revolution, abuses of the most flagrant description had demoralized the system and the men. The consequence was inevitable. During the revolution, most of these odious tax-gatherers perished on the scaffold, the innocent among them being occasionally confounded with the guilty—the real capitalist with the selfish and greedy adventurer. Even the virtues and the learning of the illustrious Lavoisier could not save him.

Farmers of the revenue are an institution of ancient origin. The Roman *publicani* (q.v.) were officers of this kind; and duties of various kinds were at one time farmed in Great Britain. See EXCISE.

FARMING'S ISLAND, an island reported to be in the north Pacific ocean, n. of the Sandwich islands, in lat. 30° 49′ n., and long. 159° 20′ w., was formally taken possession of, for the queen of England, on the 8th Feb., 1861, by her majesty's steamer *Albert*. The harbor was called English Harbor, and a point, on which there is a settlement, was termed English Point.

FARMINGTON, a village in a town and on a river of the same name in Hartford co., Conn., 31 m. n. of New Haven, on the New Haven and Northampton railroad; pop. of town, 2,616. It is an ancient, quiet, and beautiful village; with little business, but fine literary advantages. There are several churches, schools, and a seminary of the highest grade for girls. In the town there are some manufactories.

FARMINGTON, the seat of justice of Franklin co., Maine, on Sandy river, 75 m. n. of Bath, at the n. terminus of the Androscoggin division of the Maine Central railroad; pop. 3,251. It contains the court-house, the Western Maine normal school, Abbott family school, the Wendell institute for girls, and several manufactories. There are slate quarries in the vicinity.

FARM-SERVANTS. The introduction of large farms caused a wide difference to arise between the condition of master and servant. The latter has no doubt had his condition meliorated, though something remains yet to be done. Large farms effect economy in the amount of labor, and where these superseded the small holdings or pendicles, a certain number of the population had to betake themselves to the towns or the colonies. This latter process had the effect of diminishing the population in the country districts. The general advance, however, which has taken place in the

wages of the laboring-classes has been happily shared in by farm-servants for some years, and they are now well paid if they were only better housed. Farmers complain of the comparatively inferior class of servants they get nowadays, even for the increased wage. In the strictly agricultural county of Dorsetshire, wages range from 14*s.* to 20*s.* a week. In the manufacturing districts, such as in Yorkshire, they are generally somewhat higher, ranging from 17*s.* to 20*s.* a week. In Scotland, plowmen are generally paid partly in produce, but taking everything into account, wages amount to from 18*s.* to 24*s.* a week all the year through for good hands. In the n. of England, the best farm-servants are now receiving from 20*s.* to 24*s.* per week. For housing, see BOTHY. Female farm-servants receive from £12 to £18 a year, with food. Some get £12 even for the summer half-year.

FARNE, FEARNE, or FERN **ISLES**, or the STAPLES, form a group of 17 islets and rocks, some being visible only at low tide, 2 to 5 m. off the n.e. coast of Northumberland, opposite Bamborough. On one of the isles is the tower of a priory, built to the memory of St. Cuthbert, who spent the last two years of his life here. There is a hole called the churn, through which the sea rises. The passage between the isles is very dangerous in rough weather. Two of the islands have each a light-house. Here the *Forfarshire* was wrecked in 1838 (see DARLING, GRACE); and here, in 1843, the *Pegasus* met the same fate, and 60 persons were drowned.

FARNE'SÉ, the name of an illustrious family in Italy, whose origin can be traced to the middle of the 13th c., when it possessed the castle of Farneto, near Orvieto. Many of its members have filled the highest offices in the church. In 1534, cardinal ALESSANDRO FARNESE was raised to the papal see under the title of pope Paul III. (q.v.), and as his great aim was the aggrandizement of his family, he erected Parma and Piacenza into a duchy, which he bestowed on his natural son, PIETRO LUIGI. Pietro was one of the most dissolute men of his period, and after many tyrannical attempts to limit the privileges of the nobles, he was assassinated 10th Sept., 1547. He was succeeded by his son OTTAVIO (born 1520, died 1585), who married a natural daughter of Charles V., and whose reign was marked by an unbroken peace, and by various efforts made for the good of his subjects.

ALESSANDRO FARNESE, son of Ottavio, was born in 1546. He served his first campaign under his uncle, Don John of Austria, and distinguished himself at the battle of Lepanto, in the year 1571. He afterwards followed his mother into the Low Countries, then in a state of insurrection, and aided in obtaining the victory at Gembloux, 31st Jan., 1578. He was made governor of the Spanish Netherlands by Philip II., and carried on the war against the prince of Orange. The ill success of the expedition against England, to the command of which he had been appointed by Philip II., grieved him the more from the contrast it presented to his former successes. On his return to the Netherlands, he was appointed commander-in-chief of the army dispatched to the assistance of the Catholics in France, and compelled Henry IV. to raise the siege of Paris. Being, however, ill supplied with provisions and money by Philip, and insufficiently supported by the league, he was forced to yield to the superior power of Henry IV., and died soon after at Arras, in 1592. F. was really an able warrior, and though severe in his discipline, was almost worshiped by his soldiery. RANUCCIO, his son and successor, did not possess the brilliant qualities of his father: he was somber, austere, greedy, and proud. A conspiracy was hatched against him, and Ranuccio was seized, and thrown into prison. He died in 1622.—ODOARDO, a natural son of the preceding, was a prince remarkable for the elegance of his manners, and also, according to Muratori, for his magnificence, magnanimity, and liberality. He died in 1646, at the age of 34.—The family became extinct in the person of ANTONIO F., who died in 1731.

The name of the Farnese family has been bestowed upon several celebrated works of art. These are—1. The *Farnese Palace* at Rome, an edifice raised by pope Paul III., before his accession to the holy see, after the design of Antonio da San Gallo. It is in the form of a quadrangle, and was completed by Michael Angelo. The palace is one of the finest in Rome. The antique sculptures for which it was formerly renowned are now in the museum at Naples; a few classic works, however, are still to be seen in the great hall. The gallery contains the frescoes of Annibal Caracci, which are very valuable, as exhibiting in the most complete manner the new line of art which he struck out. In a room adjoining the gallery, are some mythological fresco-paintings by Domenichino. 2. The *Farnesina* is a very elegant palace in Trastevere. It owes its celebrity chiefly to the frescoes of Raphael; but it also contains frescoes by Peruzzi, Sebastian del Piombo, and a colossal head in *chiar-oscuro*, attributed to Michael Angelo. Among the antiques, formerly belonging to the Farnese family, now in the museum at Naples, are two which still bear the name of their original owners. 3. The *Farnese Bull* is the name given to a colossal group attributed to Apollonius and Tauriscus of Tralles, in Asia Minor, who probably belonged to the Rhodian school, and lived about 300 B.C. The group represents Dirce bound to the horns of a bull by Zethus and Amphion, for ill usage of her mother—a subject which, notwithstanding the vigorous mode of treatment, is on the whole unsatisfactory. Pliny mentions the transference of the group to Rome, where it first adorned the library of Asinius Pollio, and afterwards the baths of Caracalla. It was discovered anew in the year 1546, restored by Bianchi, and placed in the Farnese

palace. 4. The *Farnese Hercules*, copied by Glykon from an original by Lysippus. It exhibits the hero, exhausted by toil, leaning upon his club; the muscles and veins are still swollen, the head inclined, the expression melancholy; one hand rests upon his back and grasps one of the apples of the Hesperides.

FARNHAM, a t. in the w. of Surrey, on the left bank of the Wey, 10 m. w.s.w. of Guildford. It consists chiefly of one street running e. and west. The principal feature is the stately old castle of the bishops of Winchester, first built by bishop de Blois, brother of king Stephen. The castle was razed by Henry III., rebuilt and garrisoned by Charles I., and restored in 1684 to its present state by bishop Morley. It is an embattled quadrangle of brick, covered with stucco. A new town-hall was erected in 1866. F. has belonged to the bishops of Winchester since 860, when Ethelbald of Wessex bestowed it on them. Some parts of the parish church were built in the 12th, 15th, and 16th centuries. The chief trade is in hops, a very fine variety of which is grown in the vicinity. Pop. '71, 4,461. William Cobbett was born and is buried here. The vicinity of Aldershott camp, which is only about 6 m. to the n. of F., has increased the activity of the town

FARNHAM, ELIZA WOODSON (maiden name BURHANS), 1815–64; b. N. Y.; married in Illinois to Thomas J. Farnham, the traveler. In 1841, she returned to New York, visited prisons, and lectured to the women convicts until 1844. She was four years matron of the Sing Sing state prison. In this period she published *Life in Prairie Land*, and edited Samson's *Criminal Jurisprudence*. In 1848, she was connected with the Boston institution for the blind. She was in California from 1849 to 1856, then returned to New York, and published *California, Indoors and Out*. *My Early Days* appeared in 1859, and in that year she organized a society to aid and protect destitute women in emigration to the west. *Woman and Her Era* was published in 1864.

FARNHAM, RALPH, 1756–1861; b. Me.; a soldier in the revolution, and the last survivor of the battle of Bunker hill. He was the first settler in Acton, Me. He lived 104 yrs. 5 ms. and 19 days. About a year before his death he was complimented by a grand concert in Tremont temple, Boston.

FARNHAM, THOMAS JEFFERSON, 1804–48; b. Vt. In 1839, he led a small expedition across the continent to Oregon. In California, the same year, he procured the release of a large number of American and English prisoners from the Mexican government. His *Travels in Oregon Territory* appeared in 1842; *Travels in California* and *Scenes on the Pacific*, in 1845; a *Memoir of the North-west Boundary Line*, and *Mexico, its Geography, People, and Institutions*, in 1848.

FARN'WORTH, a t. of Lancashire, 2½ m. s.e. from Bolton-le-Moors, near the Tonge, a branch of the Irwell. It is a station on the Manchester and Bolton railway. It has a picturesque embattled chapel, of the 15th century. The manufacture of sail-canvas, watches, files, etc., is carried on. Pop. '71, 13,550.

FA'RO, a pleasant and wealthy episcopal city of Portugal, capital of the province of Algarve, is situated in a plain at the mouth of the Fermoso, in lat. 37° n., and long. 7° 52′ west. It has, on the whole, a modern aspect, but its houses are not handsome, and its streets are in general narrow. It is surrounded with walls, which are said to have been built by the Moors. The harbor of F. is somewhat confined, but the road formed by three islands at the mouth of the river affords good anchorage. F. has considera ble exports of oranges, figs, anchovies, and cork. It has also a prosperous fishery. Pop. 7,900. The number of blind people here met with is surprising, groups of five and six together being frequently observed. This is accounted for by the light sandy soil which prevails

FARO, or PHARO, a game at cards of the nature of hazard, played chiefly at gambling establishments. See Hoyle's *Games*.

FAROCHON, JEAN BAPTISTE EUGÈNE, b. Paris, 1807; a medalist and sculptor, pupil of David. He studied in Italy as a pensioner of the academy, and on returning to France gained a good reputation for his medallions. He became professor in the school of the fine arts in Paris, 1863.

FARÖE ISLES (Dan. *Faar-Oen*, sheep-islands), a group of islands, 22 in number, of which 17 only are inhabited, belonging to Denmark, and lying nearly midway between the Shetlands and Iceland, between 61° 25′ to 62° 25′ n. lat., and 6° to 8° w. long. The principal island, Stromoe (capital, Thorshavn), is 27 m. long, and 8 m. broad; those next in importance are Osteroe, Vaagoe, Bordoe, and Sudaroe. Their entire area is nearly 500 sq.m.; pop. about 8,500. The F. I. consist of basaltic elevations, none of which attain a height of 3,000 ft., and trap formations, covered with a thin vegetable soil, which yields pasturage to the cattle and numerous sheep which are reared in the islands. There are no considerable valleys or streams, but small fresh-water lakes are numerous. The coasts, which are steep and lofty, are broken by deep inlets, whirlpools, and rapids, which render navigation perilous. The furious hurricanes which prevail, prevent the growth of trees, or even of most of the ordinary vegetables and cereals; but the climate is so greatly modified by oceanic influences, that, notwithstanding the high latitude, snow rarely lies long on the ground, and the cattle can pass the greater

part of the year in the open air. Peat and coal are used for fuel; traces of iron and copper, and opal, chalcedony, etc., are found. The chief sources of wealth are flocks of sheep, and the multitudes of sea-fowl which frequent the rocks. The islanders show considerable skill in climbing the dangerous cliffs in search of birds, and they are also expert in fishing for seals and whales. Their manufactures are of the homeliest kind, but in return for the numerous articles supplied to them by the mother-country, they yield tallow, train-oil, feathers, skins, and butter, to the Danish markets. The people are of Norwegian origin, a vigorous, laborious, loyal, and religious race, and belong to the Lutheran church. They are governed by a Danish *amtmand*, or bailiff, and a landvogt, or director of the police and municipal departments, and are represented in the Danish legislature by a deputy appointed by the king. The islands, which were discovered in the 9th c. by Norwegians, have belonged to Denmark since the incorporation of Norway with that kingdom by the union of Calmar, and the language of the people is only a slightly modified form of the old Norse. England held the islands from 1807 to the treaty of Vienna, in 1814. Some account of the F. I. will be found in prof. sir Wyville Thomson's book, *The Depths of the Sea* (Macmillan & Co., 1873).

FAR'QUHAR, GEORGE, was b. at Londonderry in 1678, and received his education at the Dublin university, where, although he did not take any degree, he secured among his comrades the reputation of a wit who was a spendthrift of his witticisms. When he left the university, he was engaged as an actor by one of the Dublin theaters, but, like most dramatists who have figured on the stage, he proved but an indifferent performer. Playing a part in Dryden's *Indian Emperor*, and forgetting that he wore a sword instead of a foil, he accidentally wounded a brother-performer, and was so shocked by the occurrence that he at once quitted the boards. Accompanied by the actor Wilks, he proceeded to London, and shortly after received a commission in the regiment commanded by the earl of Orrery, which was then stationed in Ireland. Urged by Wilks, and perhaps stimulated by the gayety and leisure of military life, he, in 1698, produced his first comedy, entitled *Love and a Bottle*, which proved a success. Two years afterwards his *Constant Couple* appeared, which met with a brilliant reception, and to which he wrote a sequel, called *Sir Harry Wildair*. In 1703, he produced *The Inconstant*, founded on the *Wild-goose Chase* of Beaumont and Fletcher, a version in which all the coarseness, and none of the poetry, of the elder dramatists is retained. He married in the same year, and falling into serious pecuniary difficulties he sold his commission, and, struggling with adverse fortune, succumbed. He died of decline in 1707, leaving "two helpless girls" to the care of his friend Wilks. During his last illness, he wrote the best of his plays, *The Beau's Stratagem*—in six weeks, it is said—and died while its wit and invention were making the town roar with delight.

F. is one of the finest of our comic dramatists, although Pope called him a "farce writer." He is less icily brilliant than Congreve, and possesses on the whole more variety of character than any of his compeers. He had wit in abundance, but he had humanity too. He was a tender-hearted and somewhat melancholy man, and—what was rare in his school and in his time—*tears* are found glittering among the brilliants of his fancy.

FARR, WILLIAM, M.D., F.R.S., an eminent statistician, was b. at Kenley, in Shropshire, Nov. 30, 1807, became an assistant-surgeon at the Salop infirmary in 1826, and after attending privately the medical and scientific classes of the day, went to Paris university in 1829, where he attended the lectures of the most eminent medical professors. In 1831, he returned to England, and became a member of the university of London, where he completed his professional curriculum. F. has devoted himself mainly to a consideration of the important questions resulting from medical statistics. At first, he found it very difficult to draw the attention either of the public or of medical societies to the subject; but in the year 1837, his article, "Vital Statistics," in McCulloch's *Statistics of the British Empire*, obtained the notice and approval of certain influential persons. In the same year, the registration of all the deaths, and of the causes of death, was commenced in England, and in 1838, F. received an appointment in the general registrar's office. Since then, he has been made superintendent of a statistical department, the members of which have drawn up the new *London Tables of Mortality*, the *Quarterly Returns of Births, Deaths, and Marriages*, and the *Annual Abstracts*. In 1851, 1861, and 1871, he was employed in taking the census of Great Britain. In 1872, he was chosen a corresponding member of the French institute. F. is the author of a new *Statistical Nosology*, and of various valuable papers on the finance of life assurance, the income tax, the public health, etc.

FARRAGUT, DAVID GLASCOE, an American naval officer, was b. near Knoxville, Tenn., in 1801. In 1862, he was appointed to the command of a naval expedition to act against the confederates in the gulf of Mexico, and received the surrender of New Orleans. He afterwards took Natchez; and in 1863, he aided gen. Grant in the combined attack on Vicksburg, which resulted in its capitulation. In 1864, after a furious engagement between his fleet and the confederate forts and vessels at Mobile, he succeeded in capturing the forts, which led to the fall of the city. In 1866, he attained the rank of admiral, and a purse of $50,000 was presented to him. F. died in 1870.

palace. 4. The *Farnese Hercules*, copied by Glykon from an original by Lysippus. It exhibits the hero, exhausted by toil, leaning upon his club; the muscles and veins are still swollen, the head inclined, the expression melancholy; one hand rests upon his back and grasps one of the apples of the Hesperides.

FARNHAM, a t. in the w. of Surrey, on the left bank of the Wey, 10 m. w.s.w. of Guildford. It consists chiefly of one street running e. and west. The principal feature is the stately old castle of the bishops of Winchester, first built by bishop de Blois, brother of king Stephen. The castle was razed by Henry III., rebuilt and garrisoned by Charles I., and restored in 1684 to its present state by bishop Morley. It is an embattled quadrangle of brick, covered with stucco. A new town-hall was erected in 1866. F. has belonged to the bishops of Winchester since 860, when Ethelbald of Wessex bestowed it on them. Some parts of the parish church were built in the 12th, 15th, and 16th centuries. The chief trade is in hops, a very fine variety of which is grown in the vicinity. Pop. '71, 4,461. William Cobbett was born and is buried here. The vicinity of Aldershott camp, which is only about 6 m. to the n. of F., has increased the activity of the town

FARNHAM, Eliza Woodson (maiden name Burhans), 1815–64; b. N. Y.; married in Illinois to Thomas J. Farnham, the traveler. In 1841, she returned to New York, visited prisons, and lectured to the women convicts until 1844. She was four years matron of the Sing Sing state prison. In this period she published *Life in Prairie Land*, and edited Samson's *Criminal Jurisprudence*. In 1848, she was connected with the Boston institution for the blind. She was in California from 1849 to 1856, then returned to New York, and published *California, Indoors and Out*. *My Early Days* appeared in 1859, and in that year she organized a society to aid and protect destitute women in emigration to the west. *Woman and Her Era* was published in 1864.

FARNHAM, Ralph, 1756–1861; b. Me.; a soldier in the revolution, and the last survivor of the battle of Bunker hill. He was the first settler in Acton, Me. He lived 104 yrs. 5 ms. and 19 days. About a year before his death he was complimented by a grand concert in Tremont temple, Boston.

FARNHAM, Thomas Jefferson, 1804–48; b. Vt. In 1839, he led a small expedition across the continent to Oregon. In California, the same year, he procured the release of a large number of American and English prisoners from the Mexican government. His *Travels in Oregon Territory* appeared in 1842; *Travels in California* and *Scenes on the Pacific*, in 1845; a *Memoir of the North-west Boundary Line*, and *Mexico, its Geography, People, and Institutions*, in 1848.

FARN'WORTH, a t. of Lancashire, 2½ m. s.e. from Bolton-le-Moors, near the Tonge, a branch of the Irwell. It is a station on the Manchester and Bolton railway. It has a picturesque embattled chapel, of the 15th century. The manufacture of sail-canvas, watches, files, etc., is carried on. Pop. '71, 13,550.

FA'RO, a pleasant and wealthy episcopal city of Portugal, capital of the province of Algarve, is situated in a plain at the mouth of the Fermoso, in lat. 37° n., and long. 7° 52′ west. It has, on the whole, a modern aspect, but its houses are not handsome, and its streets are in general narrow. It is surrounded with walls, which are said to have been built by the Moors. The harbor of F. is somewhat confined, but the road formed by three islands at the mouth of the river affords good anchorage. F. has considerable exports of oranges, figs, anchovies, and cork. It has also a prosperous fishery. Pop. 7,900. The number of blind people here met with is surprising, groups of five and six together being frequently observed. This is accounted for by the light sandy soil which prevails

FARO, or Pharo, a game at cards of the nature of hazard, played chiefly at gambling establishments. See Hoyle's *Games*

FAROCHON, Jean Baptiste Eugène, b. Paris, 1807; a medalist and sculptor, pupil of David. He studied in Italy as a pensioner of the academy, and on returning to France gained a good reputation for his medallions. He became professor in the school of the fine arts in Paris, 1863.

FARÖE ISLES (Dan. *Faar-Oen*, sheep-islands), a group of islands, 22 in number, of which 17 only are inhabited, belonging to Denmark, and lying nearly midway between the Shetlands and Iceland, between 61° 25′ to 62° 25′ n. lat., and 6° to 8° w. long. The principal island, Stromoe (capital, Thorshavn), is 27 m. long, and 8 m. broad; those next in importance are Osteroe, Vaagoe, Bordoe, and Sudaroe. Their entire area is nearly 500 sq.m.; pop. about 8,500. The F. I. consist of basaltic elevations, none of which attain a height of 3,000 ft., and trap formations, covered with a thin vegetable soil, which yields pasturage to the cattle and numerous sheep which are reared in the islands. There are no considerable valleys or streams, but small fresh-water lakes are numerous. The coasts, which are steep and lofty, are broken by deep inlets, whirlpools, and rapids, which render navigation perilous. The furious hurricanes which prevail, prevent the growth of trees, or even of most of the ordinary vegetables and cereals; but the climate is so greatly modified by oceanic influences, that, notwithstanding the high latitude, snow rarely lies long on the ground, and the cattle can pass the greater

part of the year in the open air. Peat and coal are used for fuel; traces of iron and copper, and opal, chalcedony, etc., are found. The chief sources of wealth are flocks of sheep, and the multitudes of sea-fowl which frequent the rocks. The islanders show considerable skill in climbing the dangerous cliffs in search of birds, and they are also expert in fishing for seals and whales. Their manufactures are of the homeliest kind, but in return for the numerous articles supplied to them by the mother-country, they yield tallow, train-oil, feathers, skins, and butter, to the Danish markets. The people are of Norwegian origin, a vigorous, laborious, loyal, and religious race, and belong to the Lutheran church. They are governed by a Danish *amtmand*, or bailiff, and a landvogt, or director of the police and municipal departments, and are represented in the Danish legislature by a deputy appointed by the king. The islands, which were discovered in the 9th c. by Norwegians, have belonged to Denmark since the incorporation of Norway with that kingdom by the union of Calmar, and the language of the people is only a slightly modified form of the old Norse. England held the islands from 1807 to the treaty of Vienna, in 1814. Some account of the F. I. will be found in prof. sir Wyville Thomson's book, *The Depths of the Sea* (Macmillan & Co., 1873).

FAR'QUHAR, GEORGE, was b. at Londonderry in 1678, and received his education at the Dublin university, where, although he did not take any degree, he secured among his comrades the reputation of a wit who was a spendthrift of his witticisms. When he left the university, he was engaged as an actor by one of the Dublin theaters, but, like most dramatists who have figured on the stage, he proved but an indifferent performer. Playing a part in Dryden's *Indian Emperor*, and forgetting that he wore a sword instead of a foil, he accidentally wounded a brother-performer, and was so shocked by the occurrence that he at once quitted the boards. Accompanied by the actor Wilks, he proceeded to London, and shortly after received a commission in the regiment commanded by the earl of Orrery, which was then stationed in Ireland. Urged by Wilks, and perhaps stimulated by the gayety and leisure of military life, he, in 1698, produced his first comedy, entitled *Love and a Bottle*, which proved a success. Two years afterwards his *Constant Couple* appeared, which met with a brilliant reception, and to which he wrote a sequel, called *Sir Harry Wildair*. In 1703, he produced *The Inconstant*, founded on the *Wild-goose Chase* of Beaumont and Fletcher, a version in which all the coarseness, and none of the poetry, of the elder dramatists is retained. He married in the same year, and falling into serious pecuniary difficulties he sold his commission, and, struggling with adverse fortune, succumbed. He died of decline in 1707, leaving "two helpless girls" to the care of his friend Wilks. During his last illness, he wrote the best of his plays, *The Beau's Stratagem*—in six weeks, it is said—and died while its wit and invention were making the town roar with delight.

F. is one of the finest of our comic dramatists, although Pope called him a "farce writer." He is less icily brilliant than Congreve, and possesses on the whole more variety of character than any of his compeers. He had wit in abundance, but he had humanity too. He was a tender-hearted and somewhat melancholy man, and—what was rare in his school and in his time—*tears* are found glittering among the brilliants of his fancy.

FARR, WILLIAM, M.D., F.R.S., an eminent statistician, was b. at Kenley, in Shropshire, Nov. 30, 1807, became an assistant-surgeon at the Salop infirmary in 1826, and after attending privately the medical and scientific classes of the day, went to Paris university in 1829, where he attended the lectures of the most eminent medical professors. In 1831, he returned to England, and became a member of the university of London, where he completed his professional curriculum. F. has devoted himself mainly to a consideration of the important questions resulting from medical statistics. At first, he found it very difficult to draw the attention either of the public or of medical societies to the subject; but in the year 1837, his article, "Vital Statistics," in McCulloch's *Statistics of the British Empire*, obtained the notice and approval of certain influential persons. In the same year, the registration of all the deaths, and of the causes of death, was commenced in England, and in 1838, F. received an appointment in the general registrar's office. Since then, he has been made superintendent of a statistical department, the members of which have drawn up the new *London Tables of Mortality*, the *Quarterly Returns of Births, Deaths, and Marriages*, and the *Annual Abstracts*. In 1851, 1861, and 1871, he was employed in taking the census of Great Britain. In 1872, he was chosen a corresponding member of the French institute. F. is the author of a new *Statistical Nosology*, and of various valuable papers on the finance of life assurance, the income tax, the public health, etc.

FARRAGUT, DAVID GLASCOE, an American naval officer, was b. near Knoxville, Tenn., in 1801. In 1862, he was appointed to the command of a naval expedition to act against the confederates in the gulf of Mexico, and received the surrender of New Orleans. He afterwards took Natchez; and in 1863, he aided gen. Grant in the combined attack on Vicksburg, which resulted in its capitulation. In 1864, after a furious engagement between his fleet and the confederate forts and vessels at Mobile, he succeeded in capturing the forts, which led to the fall of the city. In 1866, he attained the rank of admiral, and a purse of $50,000 was presented to him. F. died in 1870.

FARRAKHÁBÁD, or FURRUCKABAD, a district in the Agra division of the n.w. provinces of British India; a flat alluvial plain on the Ganges, which has a course through and along the district of 87 m.; 1744 sq.m.; pop. '72, 918,748; Hindus, 816,733; Mohammedans, 101,538; Christians, 477. Chief products, rice, wheat, barley, millet, pulse, cotton, sugar-cane, and potatoes. The chief town, on the Ganges, bears the same name.

FARRANT, RICHARD, a composer of English church-music in the 16th c., of whose life little is known. Among the most admired of his compositions are the anthems *Call to Remembrance* and *Hide not thy Face*. He is credited on insufficient proof with being the author also of *Lord, for thy Tender Mercies' Sake*.

FARRAR, ELIZA WARE, 1791–1870; a daughter of Benjamin Rotch of New Bedford, Mass.; b. Flanders (Europe); in 1828, married prof. John Farrar of Harvard college. She was the author of *Congo in Search of his Master; Children's Robinson Crusoe; The Story of Lafayette; The Life of Howard; Youth's Letter-Writer; Young Lady's Friend;* and *Recollections of Seventy Years*. Her later years were spent in Springfield, Mass.

FARRAR, FREDERIC WILLIAM, D.D., b. Bombay (India), 1831; graduate of Cambridge, Eng.; master of Marlborough college in 1871; and was made chaplain in ordinary to the queen. He has published *Eric; Julian Home;* and *St. Winifred's*. His philological works are *The Origin of Language; Chapters on Language; Greek Grammar Rules; Greek Syntax;* and *Families of Speech*. His theological works are *Seekers after God; The Silence and Voices of God; The Witness of History to Christ* (the Hulsean lectures for 1870 before the university of Cambridge); and *The Life of Christ*, which, among the many recent works on the same theme, is of great importance and interest as the matured production of one who has lovingly studied the Scripture testimony concerning Christ, aided by the lights of literature and discussion, as well as by his own sojourn in the land where that life was lived; and who, with faith in the manifestation of Christ's divine work through nearly 19 centuries, seeks in the words and works recorded in the gospels the causes which awakened faith in Christ before the Christian history had been developed or the Christian name known. *The Life and Work of St. Paul*, from this author, is a companion work to the preceding. His *Eternal Hope*, a book not so much of argument as of glowing rhetoric, while not professing to invalidate the received doctrine of the church regarding the future of the ungodly, has met severe criticism as tending to reduce at least the stringency of the application of those doctrines.

FARRAR, JOHN, LL.D., 1779–1853; b. Mass.; graduated at Harvard in 1803, and studied theology at Andover; was Greek tutor at Harvard in 1805; in 1807, became Hollis professor of mathematics and natural philosophy. He published a translation of Lacroix's *Elements of Algebra*, and contributed many articles to scientific periodicals. In consequence of ill health he resigned his chair in 1836.

FARRAR, TIMOTHY, LL.D., 1747–1849; born Mass.; graduated at Harvard college, 1767. He settled in New Hampshire and taught school about 1770. He was a maj. in the American army in the revolution, was a justice of the common pleas for 40 years. In 1842, he was appointed chief-justice of New Hampshire. He was also a member of the new Hampshire constitutional convention, and one of the committee which drafted the constitution.

FARREN, ELIZA, Countess of Derby, 1759–1829; an English actress, playing with great success in the London theaters in the latter part of the last century. In 1797, she married the 12th earl of Derby, a widower.

FARRER, HENRY, b. London, England, 1843; an artist in water colors, residing in New York; brother of Thomas Charles Farrer.

FARRER, THOMAS CHARLES, b. London, 1838; an English artist; studied drawing in Ruskin's free school, and in 1858 came to the United States. In the war of the rebellion he served in the union ranks as a private. Soon after the war he returned to England, where he still resides.

FARRIER (from *ferrum*, iron), a person who shoes horses and treats their diseases. The better class of farriers often were, and indeed still are, men of great shrewdness and observation, sometimes possessing considerable experience, and with skillful, useful hands. Their management of sick horses is occasionally sensible, but generally altogether empirical. They have usually but crude ideas of the structure, functions, or diseases of animals, and pin their faith mainly on a few carefully cherished recipes. To their calling as horse-doctors and shoeing-smiths (see SHOEING), they usually unite those of cow-leech and cutter of colts and pigs, and although still met with in many of the rural districts of England and Ireland, their practice is passing into the hands of regularly educated veterinarians. See VETERINARY MEDICINE.

FARRIERS, ARMY. Farriers-major and farriers are non-commissioned officers in the cavalry, artillery, engineers, and military train, whose duty it is to shoe the horses of their corps, and, generally, to assist the veterinary surgeon in exercising a proper care over the regimental animals. They receive the same pay as other sergeants (with whom they rank); and, in addition, certain allowances proportionate to the number of animals in charge. The sum necessary to defray this allowance for a year is about £10,000.

FARRIERY. See FARRIER and HORSESHOEING, *ante.*

FARS, or FARSISTAN (anciently *Persis*), a province of Persia, on the e. shore of the Persian gulf, lying between lat. 27° 30′ and 31° 30′ n., and between long. 49° 30′ and 55° east. The coast region is flat, with a hot climate; inland, the ground rises to an elevation of from 2,000 to 3,000 ft., the climate is cooler, and valleys, alike remarkable for their beauty and fertility, ranging from 15 to 100 m. in length, are numerous. East of this hilly district the province again become flat and sandy; and here occurs the large salt-lake Bakhtegan. The chief rivers are the Bundemeer (anciently Araxes), the Nabon, and the Tab (anciently Arosis). The province produces tobacco, wine, rice, dates, opium, linen, cotton, silk, cochineal, and roses for the manufacture of attar. It has iron and lead mines, marble and alabaster qurries, and yields also borax and naphtha. It trades mainly with India. The principal towns are Shiraz, Jehroom, Darab or Darabgerd, Behbehan or Babahan, and Bushire. North of Shiraz, at a distance of about 30 m., lie the ruins of the ancient and splendid city of Persepolis. F. also contains the remains of Shahpur, a city older than the age of Alexander the great, and the celebrated sculptured rocks, called by the Persians *Naksh-i-Rustam.* A cold winter and heavy floods prevailed in 1873–74, which caused great damage to property; neerly one third of the city of Shiraz was destroyed by the floods.

FARSAN′ ARCHIPEL′AGO, a group of islands in the s.e. of the Red sea, the chief of which are Farsan Kebeer, 31 m. long, and Farsan Seggeer, 18 m., in lat. 16° 30′ to 17° n., and long. 41° 45′ to 42° 10′ east. They would be valuable as harbors, were it not for the reefs in the vicinity.

FARTHING (Sax. *feorthung,* from *feorth;* fourth), the fourth part of a penny (q.v).

FARTHINGALE, old form of the word (as found in bishop Latimer) *verdingale,* is probably a corruption of the French *vertugade,* which is itself a corruption of *vertugarde,* signifying guard of modesty. For a description of the F., see CRINOLINE.

FARYNDON INN, the name formerly borne by Sergeants' inn, Chancery lane. This building belonged to the bishops of Ely, by whom, in 1411, it was left to the sergeants-at-law. In 1484, the name was changed to Sergeant's inn (q.v.).

FASA′NO, a t. of Italy, in the province of Bari, and 33 m. s.e. of the town of Bari, is situated on the high-road from that town to Brindisi. It is small, but wealthy. The whole of the district of F. abounds in olive plantations, and there are numerous oil-presses in the town and neighborhood. Pop. '71, 12,809.

FAS′CES were bundles of rods usually made of birch, but sometimes of elm, with an axe projecting from the middle of them, which were carried before the chief magistrates of ancient Rome, as symbols of their power over life and limb. They were borne by the lictors, at first before the kings; in the time of the republic, before consuls and prætors; and afterwards before the emperors. Their number varied, a consul having twelve, and a prætor six; but within the city only two. Valerius Publicola introduced a law that within the city the axe was withdrawn, except in the case of a dictator, who was preceded by 24 lictors, bearing as many fasces. Publicola also made the F. be lowered at the assemblies of the people, as an acknowledgment of their supreme power.

FAS′CIA, in architecture, a flat space or band, like a broad ribbon, usually between moldings of the architrave. Architraves are called single, double, or triple fasciæ architraves, according to the number of fasciæ into which they are divided.

FASCINATION BY SERPENTS. A power has long been popularly ascribed to serpents, or at least to some kinds of them, of fascinating by their eye the small animals on which they prey, so as to prevent the escape of the intended victim, when its escape would otherwise be easy, and to cause it rather to run or flutter into the mouth which is open to devour it. This popular notion has been ridiculed, but is supported by a large amount of evidence, and has been fully adopted by some of the most scientific observers. In the earlier part of last century, Kalm described the rattlesnake as frequently lying at the bottom of a tree, on which a squirrel is seated, and fixing its eyes on the little animal, which from that moment cannot escape, but begins a doleful outcry, comes towards the snake, runs a little bit away, comes nearer, and finally is swallowed. Le Vaillant describes a similar scene, as witnessed by him in Africa, a shrike incapable of moving away from a serpent which was gazing fixedly at it, and dying of fear, although the serpent was killed. Dr. Andrew Smith states that the presence of a non-venomous South African tree-snake, *bucephalus viridis,* in a tree, causes the birds of the neighborhood to collect around it and fly to and fro, uttering piercing cries, "until some one, more terror-struck than the rest, actually scans its lips, and almost without resistance, becomes a meal for its enemy." He adds, "whatever may be said in ridicule of fascination, it is nevertheless true that birds, and even quadrupeds, are, under certain circumstances, unable to retire from the presence of certain of their enemies; and what is even more extraordinary, unable to resist the propensity to advance from a situation of actual safety, into one of most imminent danger. This I have often seen exemplified in the case of birds and snakes; and I have heard of instances equally curious, in which antelopes and other quadrupeds have been so bewildered by the sudden appearance of crocodiles, and

by the grimaces and contortions they practiced, as to be unable to fly, or even move from the spot towards which they were approaching to seize them." Ellis, in his *Three Visits to Madagascar*, records anecdotes of the same kind, and one in particular, of a frog apparently unable to move, until an object was pushed between it and the eye of the snake, when the frog immediately darted away, as if relieved from some mesmeric influence exerted over it.

FASCI'NES (from Lat. *fascis*, a bundle) are fagots for military purposes made of young branches of trees or brushwood, and also of osiers, bound together with yarn or withes. They are about a foot in diameter, and of various lengths, averaging 12 ft., according to the object for which they are intended. F. are used in the construction of temporary works; for filling a ditch, and sometimes, in a pile, for setting fire to an obstruction. Before a siege, the soldiers are employed in making F. in great number; and when needed, each soldier bears one to the place, casts it on the heap, and the quantity required is thus accumulated in a remarkably short time.

FASCI'OLA, a generic name formerly employed to designate all the *trematode entozoa*, as flukes, etc., which are now, however, divided into many genera.

FASHION, or, as the French term it, *la mode*, admits as little of exact definition as of being referred to any intelligible principle. In every age and country, there has been a recognizable costume or general style of male and female attire, along with certain niceties in the shape, color, and texture of dress, which, fluctuating according to taste or whim, are known as the F.—a word which etymologically signifies making in a particular form. The terms F. and fashionable are, however, so comprehensive as to include much beyond the sphere of the toilet; as, for example, a style of speaking, living, and forming opinions; there being, to use a common phrase, "a fashion in everything." It is only in China and some other eastern countries that, in consequence of dress being regulated by sumptuary laws or some equally strict traditions, the fashions of attire remain from generation to generation with little or no change.

The nature of clothing, and the necessity for its use, being treated in the articles WEAVING and SANITARY SCIENCE, what seems desirable here is to glance at the leading forms of dress and more conspicuous fashions that have prevailed in western Europe, and more particularly in England, since the dawn of civilization. Our modern costume has seemingly had a double origin—that of the Romans and of the Teutonic people, who in different branches invaded France and Britain. The usual Roman dress, in the latter period of the empire, consisted of a tunic, or loose upper garment, with a dress for the lower limbs, called *braccæ;* hence the modern term *breeches*. Over all was occasionally worn by the higher classes the *toga*, or mantle. It is believed that these Roman costumes were generally copied by the greater number of British, at least among the more opulent classes. In the dress of the women, however, there was but little change. They appear in two tunics, the one reaching to the ankles, the other having short sleeves, and reaching about half-way down the thigh: in other words, they resemble a round gown, or bedgown and petticoat, though the latter, distinct from a body and sleeves, is not considered to be ancient. This tunic was called in British *gwn;* hence our word *gown*, of which we still see specimens of short dimensions worn by women of the humbler classes in England, Scotland, and Wales.

The Anglo-Saxon and Danish periods of English history are marked by new peculiarities in costume. Soon after the departure of the Romans, and the arrival of the Saxons in the 5th c., fashions of apparel were introduced from northern Germany, which continued with no material change for several centuries. The most important improvement in the ordinary dress of the people was the introduction of the *shirt*, a linen garment worn next the skin, for which we are indebted to the Saxon invaders. The common dress of the 8th c. consisted, as we find, of linen shirts; tunics, or a kind of surcoat; cloaks fastened on the breast or shoulders with brooches; short drawers met by hose, over which were worn bands of cloth, linen, or leather, in diagonal crossings. Leathern sandals were worn by the early Anglo-Saxons; but afterwards the shoe became common: it was very simple, and well contrived for comfort, being opened down the instep, and there, by a thong passed through holes on each side of the slit, drawn tight round the feet like a purse. A felt or woolen cap, called *hæt* (hence our modern word *hat*), was worn by the higher class of Anglo-Saxons; but it is generally believed that the serfs or lower orders were without any other covering for the head than what nature had given them. The Anglo-Saxon tunic still exists in the *smock-frock*, a species of overall generally worn by the peasantry and some farmers in England. The *blouse*, worn by workmen in France and Switzerland, has an equally early origin.

The Norman conquest introduced greater taste and splendor into British costume. Now, were introduced gloves (q.v.), along with the fashions of chivalry. A gentleman of the reign of Henry V. was dressed in a short tunic, buttoned in front, with girdle, large loose sleeves, tight hose forming pantaloons and stockings in a single piece, peaked shoes, and head-cloth or cap. About this period, silks and velvets of divers colors came into use among the higher classes, by whom gold chains were generally worn. The dress of ladies was of the richest kind. Gowns were embroidered and bordered with furs or velvet; and the bodice, laced in front over a stomacher, now first appeared. But the greatest eccentricity was the lofty steeple head-dress; this consisted of a roll of

linen, covered with fine lawn, which hung to the ground, or was mostly tucked under the arm.

In the 16th c., the upper part of the long hose or nether garments began to be worn loose, or slashed with pieces of different colors let in, and the arms and shoulders of the doublet or jacket were fashioned in a similar style. Boots were also worn loose on the leg, with the upper part falling down; hence the origin of the *buskin*. Ruffs or ruffles, collars, and velvet bonnets with feathers, came likewise into use, as may be seen from the paintings of Henry VIII. Hall, the chronicler, describes several of Henry's superb dresses, and among them a *frocke*, or coat of velvet, embroidered all over with gold of damask, the sleeves and breast cut and lined with cloth of gold, and tied together "with great buttons of diamonds, rubies, and orient pearls." The cloaks and mantles were of corresponding magnificence. The shirts were pinched or plaited, and embroidered with gold, silver, or silk. The term *hose* continued to be applied to the entire vestment, from the waist to the feet, throughout this century; the material is more distinctly stated, for Henry wore knit silk as well as cloth hose: the precise period of the separation of the hose into breeches and stockings, is not so clear as the derivation of the latter term from the "*stockying* of hose;" "that is, adding the lower part that covered the legs and feet to that which was fastened by points to the doublet," and was called the *stocks*. The shoes and buskins were of the German fashion, very broad at the toes, and of velvet and satin, slashed and puffed. The hats, caps, and bonnets were of almost endless forms and colors

The dress of the middle ranks in the reign of Henry VIII. may be seen in prints of the time; plain russet coats, and a loose kind of kersey breeches, with stockings of the same piece, were the ordinary suit; and the London apprentices wore blue cloaks in summer, and gowns of the same color in winter, as badges of servitude; for this appears to have been the age of domestic distinctions—the relics of the feudalism of the middle ages. The women wore russet, or long woolen gowns, worsted kirtles (hereafter called *petticoats*), and white caps and aprons, and white underlinen came into general wear.

The principal novelty of the reigns of Edward VI. and Mary was the flat round bonnet or cap, of plain velvet or cloth, worn on one side of the head, and decorated with a jewel and single ostrich feather. The bonnet itself is preserved in the caps worn at the present day by the boys of Christ's hospital; and their blue coat and yellow stockings are such as were worn by the London apprentices at the date of the foundation of the hospital by the youthful Edward. See HOSIERY.

The male costume in Elizabeth's reign was the large trunk hose, long-waisted doublet, short cloak, hat, band, and feather, shoes with roses, and the large ruff; but the great breeches, "stuffed with hair-like woolsacks," after the separation of the hose into this garment and stockings, appear to have been worn throughout the reign; they were made of silk, velvet, satin, and damask. The doublets were still more costly, and quilted and stuffed, "slashed, jagged, pinched, and laced;" and over these were worn coats and jerkins in as many varieties as there are days in the year. The cloaks were of the Spanish, French, and Dutch cuts, of cloth, silk, velvet, and taffeta of all colors, trimmed with gold, silver, and silk-lace and glass bugles, inside and outside equally superb. The stockings, shoes, slippers, and ruffs resembled those of the ladies.

Hats now began to supersede the bonnets of a former era. Those of beaver were exceedingly expensive, and they were for the most part made of felted wool, dyed. The most remarkable thing about these hats was their numerous shapes; some were steeple-crowned; others were flat and broad, like the battlements of a house; and others with round crowns, and bands of all colors, and ornamented with huge feathers, and brooches, clasps, and jewels of great value. See HAT.

As regards female attire, the more conspicuous features in the reign of Elizabeth were the farthingale (q.v.) and ruff. The farthingale, or fardingale, consisted in an extravagant expansion of the lower garments, by means of cane or whalebone, by which the lady seemed to walk in a kind of tub. The farthingale, which is referred to by Shakespeare, Butler, and other writers, mostly in a satiric vein, was the predecessor of the hoop, which in its turn, after an interval, was succeeded by the crinoline (q.v.) and hoop-work of steel. The widely extended ruff of fine linen, like a huge frill, is seen in the pictures of Elizabeth and her envied rival, Mary queen of Scots, both stars of F. in their day.

Under James I., the male costume was somewhat more Spanish, as respects the slashing and ornamenting of the doublet and breeches. Late in the reign, however, the jackets or doublets were shortened, and the breeches reduced in size, and fastened in large bows at the knees; the well-stockinged leg was admired, and the hat worn low in the crown, and with broad brim, as seen in portraits of the date 1619. Beards and whiskers had become almost universal in the reign of Elizabeth; but in that of James, the former was sometimes worn trimmed to a point, hanging down at the division of the ruff.

In the female costume, there was little change. The farthingale continued to be worn by ladies of quality; a strong passion for foreign lace was introduced; pearls were the favorite jewels; and the ruff maintained its sway, so as to be anathematized from the pulpit; and the fancies of female costume were glanced at in a sermon preached before the king at Whitehall in 1607-8, as "her French, her Spanish, and her foolish fashions."

The F. of dress in the reign of Charles I. became still more decidedly Spanish and picturesque. There were now worn collars of rich point-lace, large and hanging down on the shoulders, held by a cord and tassel at the neck, and now called *Vandyke*, from its being the most striking part of the dress in which Vandyke at that time painted portraits.

The principal habits were vests and cloaks of velvet, or silk damask, short-trousered breeches terminating in stuffed rolls, and fringes and points, and very rich boots, with large projecting lace tops. A dress of Charles is thus described: A falling band, green doublet (from the armpits to the shoulders wide and loose), zigzag turned-up ruffles, long green breeches (like a Dutchman's), tied below the knee with yellow ribbons, red stockings, green shoe-roses, and a short red cloak lined with blue, with a star on the shoulder; the king sometimes wore a large cravat, and at other times a long falling band with tassels. The dress of the gay courtiers or cavaliers consisted of a doublet of velvet, silk, or satin, with large loose sleeves, slashed, and embroidered; Vandyke collar and band, and short embroidered cloak, worn on one shoulder; the long breeches, fringed and pointed, met the ruffled tops of the boots; the embroidered sword-belt was worn over the right shoulder, and in it was hung a Spanish rapier, and in the flapping beaver hat was worn a plume of feathers confined by a jewel. A buff coat or jerkin was often worn, as a better defense than the doublet, which it sometimes covered.

The female costume of this period was rather elegant than splendid. Gowns with close bodics and tight sleeves were worn, though the farthingale was retained, with a gorget ruff standing up about the neck like a fan. French hoods were still worn, though with little distinction as to rank. The hair was worn in small curls, and the hoods, of all colors, fastened under the chin with curious effect. Ear-rings, necklaces, and bracelets were much worn; but the Puritans forbade the females to wear lace, jewels, or even braided hair; and they retained the close hood and high-crowned hat.

Towards the close of the reign of Charles I., the cumbrous farthingale disappeared, with the yellow starched ruff and band. These tasteless fashions being dismissed, the female dress became very elegant, with its rich full skirt and sleeves, and falling collar edged with rich lace, and the hair worn in graceful ringlets; but these vanities were condemned by the Puritan party.

With the restoration of Charles II. came certain tasteless innovations upon the elegant Vandyke costume of the time of Charles I., which were the first resemblance to the coats and waistcoats of the present day. Thus our most picturesque attire lasted little more than a quarter of a century. Its decline was gradual; its chivalric character soon degenerated into grotesqueness, which in its turn changed to stark meanness. Early in the reign of Charless II., the doublet was much shortened, and worn open in front, where, and at the waistband, the rich shirt was shown; and the loose sleeves and breeches were decked with ribbons and points, and from the knee-bands hung long lace ruffles. At the wrists, too, ruffles were worn; but the lace-collar was shorn of its points. The cloak was retained upon the left shoulder, and the high-crowned and plumed hat remained for a short time; but the crown of the hat was soon lowered.

The petticoat breeches were another absurdity; although ornamented with ribbons at the sides, the lining strangely appeared below the breeches, and was tied at the knees; to match which, the sleeves of the doublet only reached to the elbows, and from under them bulged the ruffled sleeves of the shirt, both being ornamented with ribbons. Meanwhile the skirt of the doublet had been lengthened from above the waist nearly to the knees, and had buttons and button-holes in its entire length, thus becoming a *coat*, and so named in an inventory of 1679; wherein also are the items of *waistcoat*, *breeches*, *pantaloons*, *drawers*, and *trousers*, being the earliest mention of these articles. Stockings of various kinds were common; and "the lower ends of stockings" are understood as socks. Instead of the lace-collar was worn the long square-ended cravat, of the same material, from Brussels and Flanders.

Passing to the reigns of James II. and William III.; we find the male attire gradually fashioned according to the artificial costume of the court of Louis XIV. Every article of dress was now more prim and exact. The petticoat breeches were exchanged for the close-fitting garments tied below the knee, and therefore called *knee-breeches;* the broad-rimmed hats were turned up on two sides and edged with feathers or ribbons; we began to see the rich long lace cravat and embroidered waistcoat; and the band was now narrowed, so as to resemble that worn at the present time by clergymen. Wigs, which had been some time in use, were worn still longer than hitherto, hanging down in front, or flowing upon the shoulders, though the color was altered from black to suit the complexion. From the 17th to the end of the 18th c., was the era of *hair-powder* (q.v.), *wigs* (q.v.), and cocked-hats; in these as in other matters there being an excessive artificiality in the tastes of the higher classes. A gentlemen of 1750 might have been seen with his flowing coat and ample cuffs, frills at the wrist, deep waistcoat hanging over the legs, long white hose drawn over the knees, his cocked-hat folded under his arm, and in his hand an open snuff-box (q.v.). Such was the appearance of what is traditionally known as the "old English gentlemen." The coats of the 18th c. were of velvet, silk, or satin, as well as broadcloth, and their colors very fanciful. Hogarth's favorite color was sky-blue; Reynolds's deep crimson and violet; and Goldsmith rejoiced in plum-color. About 1790, cloth became the general wear; the waistcoat being of the

costlier materials, and embroidered, and sometimes the breeches. Buckles were worn at the knees and in the shoes till the close of the century; and the large square plated buckle was the *ton* until 1791, when shoe-strings became general. Among the artificialities of dress during the greater part of the 18th c., none was more odious than that of hoops (q.v.), worn by ladies, who, by these means of expansion, were made to appear as if standing in an inverted tub. In the reigns of George I. and II., a lose kind of drapery at the back of the dress, called a *sacque*, and hooded silk-cloaks, were worn, also a very small muff, such as have been lately revived. In the 18th c., after the disuse of towering head-dresses, veils (q.v.) of an elegant fabric were introduced, and the fan (q.v.) was an important article for ornament and flirtation.

The formalities of the 18th c. received a severe blow at the French revolution; and in the ten years from 1790 to 1800 a more complete change was effected in dress, by the spontaneous action of the people, than had taken place at any previous period in a century. The change began in France, partly to mark a contempt for old court usages, and partly in imitation of certain classes of persons in England, whose costume the French mistook for that of the nation generally. This new French dress was introduced by the party who were styled the sans culottes. It consisted of a round hat, a short coat, a light waistcoat, and pantaloons; a handkerchief was tied loosely round the neck, with the ends long and hanging down, and showing the shirt-collar above; the hair was cut short, without powder, *à la Titus*, and the shoes were tied with strings.

The comparatively simple form of dress of the sans culottes found many admirers in England, and soon became common among young men; the change from antique fashions was also greatly helped by the imposition of a tax on the use of hair-powder, which was henceforth generally abandoned. Pantaloons, which fitted closely to the leg, remained in very common use by those persons who had adopted them till about the year 1814, when the wearing of trousers, already introduced into the army, became fashionable. It is proper, however, to mention that trousers had, for the previous fifteen or twenty years, been used by boys, and were perhaps from them adopted by the army. Previous to the French revolution, the dress of boys was almost the same as that of men. Although trousers—called by the Americans *pants*—were generally worn after 1815, many elderly persons still held out in knee-breeches against all innovations, and to the present day an aged gentleman may occasionally be seen clinging to this 18th c. piece of dress. The general use of white neckcloths continued, notwithstanding the introduction of the standing collar, till the reign of George IV., when this monarch's taste for wearing a black silk kerchief or stock, and also the use of black stocks in the army, caused a remarkably quick abandonment of white neckcloths and the adoption of black instead. The year 1825, or thereabouts, was the era of this signal improvement in costume.

While these leading changes were effecting, other alterations of a less conspicuous nature were from time to time taking place. The disbanding of the army after the peace of 1815 led to various transformations besides those we have mentioned. While pantaloons were the fashionable dress, it became customary to wear Hessian boots; these, which had originated among the Hessian troops, were without tops, and were worn with small silk tassels dangling from a cut in front; being drawn over the lower part of the pantaloons, they had a neat appearance; but the keeping of them clean formed a torment that prevented their universal use. See Boots. When trousers were introduced from the practice of the army, the use of Wellington boots to go beneath them also became common. Referring to the era of 1815 to 1825 as that in which trousers, Wellington boots, and black neckcloths or stocks came into vogue, we may place the introduction of the surtout in the same period of history. From the time when the collarless and broad-skirted coat had disappeared about the commencement of the century, the fashion of coats had changed in various ways till the above-named era, when the loose frock-coat or surtout was added to the list of garments.

Such is the general account of the progress of fashions in England until nearly the present day. In these fashions, the Welsh, Irish, and Scotch have participated, and there is now little to distinguish the inhabitants of one part of the United Kingdom from another. What differences exist in particular localities—as, for instance, the round hats of the women in Wales, the checked gray *plaid* of the lowland Scottish peasantry, and the *tartan* of the highlanders—will receive some notice under their appropriate heads.

The general simplifying of dress subsequent to 1815, was not unaccompanied by an expiring effort to sustain a high style of fashion. The *macaroni*, or highly dressed beau of the 18th c., was now succeeded by the *dandy*, who, with mincing, affected manners, prided himself on his starched collars, his trousers-straps, and the flashy bunch of seals which dangled from his watch-chain. The regency was the era of this kind of supreme dandyism, but it continued till later times, and characterized a number of leading public personages, of whom notices occur in Raike's *Reminiscences*, from 1831 to 1851. In the present day, may be noted a kind of break-down of everything like formality in gentlemen's walking costume. Plain cloths, of divers hues, called Tweeds (q.v.), have almost superseded materials of a superior quality; cloth caps, or soft felted hats, called *wide-awakes* (see Hat), cover the head; and the feet are provided with short ankle-boots instead of Wellingtons. In the evening or dinner costume, however, the old etiquette of

dress-coats and white neck-cloths is still maintained. Among the changes that are taking place in the morning or walking dress, none is so remarkable as the growing fashion of wearing *knickerbockers*. These are wide loose trousers to below the knee, leaving the lower part of the leg only stockinged or covered with leggings. This fashion, which has been copied more immediately from the French zouaves (q.v.), and partly perhaps from the common practice of stuffing the lower parts of the trousers roughly into boots in the western regions of the United States, is very much a resumption of the costumes seen in old Dutch prints. Should it become general, leg-gaiters or boots will come again into use, and the present generation may live to see the fashion of male attire work once more round to the knee-breeches of the 18th century. In female as well as in male costume, fashion seems to have a tendency to work in a circle; of this, the late, but now obsolete, resumption of the farthingale, or hoop, under the name of crinoline, offers a sufficient example, besides affording a ludicrous instance of the unreasoning manner in which extravagances in dress are usually followed. It is to be observed, however, that Englishwomen, chargeable as they are with this absurdity, set a most creditable example to their sex all over the world, in allowing no fantastic change of fashion to prevent them from taking out-door exercise in all weathers, which the introduction of india-rubber goloshes (q.v.) has materially aided.

As to the moral view that may be taken of the whimsicalities of female fashions, we might refer to the numerous papers of Steele in the *Tatler* and *Spectator*, and also the writings of other 18th c. essayists; passing these over, it is enough to quote the words of Hazlitt, a more recent essayist. "fashion," he says, "constantly begins and ends in two things it abhors most—singularity and vulgarity. It is the perpetual setting up and then disowning a certain standard of taste, elegance, and refinement, which has no other formation or authority than that it is the prevailing distraction of the moment; which was yesterday ridiculous from its being new, and to-morrow will be odious from its being common. It is one of the most slight and insignificant of all things. It cannot be lasting, for it depends on the constant change and shifting of its own harlequin disguises; it cannot be sterling, for, if it were, it could not depend on the breath of caprice; it must be superficial, to produce its immediate effect on the gaping crowd; and frivolous, to admit of its being assumed at pleasure by the number of those who affect to be in the fashion, to be distinguished from the rest of the world. It is not anything in itself, nor the sign of anything, but the folly and vanity of those who rely upon it as their greatest pride and ornament. It takes the firmest hold of weak, flimsy, and narrow minds, of those whose emptiness conceives of nothing excellent but what is thought so by others. That which is good for anything is the better for being widely diffused. But fashion is the abortive issue of vain ostentation and exclusive egotism: it is haughty, trifling, affected, servile, despotic, mean and ambitious, precise and fantastical, all in a breath—tied to no rule, and bound to conform to every rule of the minute." For a large variety of amusing particulars concerning fashions, "stars of fashion," etc., during the past two centuries, we refer to Mrs. Stone's *Chronicles of Fashion* (Lond., 2 vols., 1845.)

W.C.

FAST (a word common to the Teutonic tongues, which Grimm derives from a root signifying primarily to hold, keep, observe, and hence to restrain one's self; Lat. *jejunium*, Gr. *nēstéia*, Hebr. *tsom*) is the word used to express a certain self-imposed restraint with respect to the nourishment of the body. The abstinence enforced may be either partial, when the restriction is confined to certain articles of food; or total, when all sustenance is dispensed with for a specified time. The origin of the custom seems to be coeval with man's first experience of the salutary influence which abstinence exercises on the health, and with his more or less instinctive consciousness of the necessity of retaining the body in due subjection to the soul. By degrees, the self-mortification which it implied raised it into a sacrifice offered to the Deity; it became a religious observance, was surrounded with rites and ceremonies, and finally bore the stamp of a divine law. Climate, the habits of a people, and their creed, gave it at different periods different characteristics; but it may be pronounced to have been a recognized institution with all the more civilized nations, especially those of Asia, throughout all historic times. We find it in high estimation among the ancient Parsees of Irania. It formed a prominent feature in the ceremonies of the mysteries of Mithras; and found its way, together with these, over Armenia, Cappadocia, Pontus, and Asia Minor, to Palestine, and northward to the wilds of Scythia. The ancient Chinese and Hindus, and principally the latter, in accordance with their primeval view—which they held in common with the Parsees—of heaven and hell, salvation and damnation, of the transmigration of the soul, and of the body as the temporary prison of a fallen spirit, carried fasting to an unnatural excess. Although the Vedas attach little importance to the excruciation of the body, yet the Pavaka, by the due observance of which the Hindu believer is purified from all his sins, requires among other things an uninterrupted fast for the space of twelve days. Egypt seems to have had few or no compulsory general fasts; but it is established beyond doubt, that for the initiation into the mysteries of Isis and Osiris, temporary abstinence was rigorously enforced. In Siam, all solemn acts are preceded by a period of fasting, the seasons of the new and full moon being especially consecrated to this rite. In Java, where abstinence from the flesh of oxen is part of the religion of

all, Buddhists and worshipers of Brahma alike, the manner and times of the observance vary according to the religion of the individual. Again, in Thibet, the Dalai-lamaites and Bogdo-lamaites hold this law in common. That Greece observed and gave a high place to occasional fast days—such as the third day of the festival of the Eleusinian mysteries, and that, for instance, those who came to consult the oracle of Trophonius, had to abstain from food for twenty-four hours—is well known. It need hardly be added, that the Romans did not omit so important an element of the festivals and ceremonies which they adopted from their neighbors, though with them the periods of fasting were of less frequent recurrence. See THESMOPHORIA.

As to the Semitic races, although we find the people of Nineveh undergoing occasional fasts, to which even animals were made to conform, yet the Mosaic law set apart one day only in the whole year for the purpose of fasting. The 10th day of the seventh month (Tishri), called "the Day of Atonement" (Yom Kippur), or, as the holiest of the whole year, "the Sabbath of Sabbaths," was ordained for "the chastening of the *Nephesh*," which the traditional law explains as meaning the strictest and most rigorous abstinence from all food or drink, as also from washing, anointing, the putting on of sandals, etc., from the sunset of the ninth to the rising of three stars on the evening of the tenth day. In process of time, five days of compulsory fasting were added, in commemoration of certain days of humiliation and national misfortune—viz., the 17th of the fourth month (Tamus), as the anniversary of the taking of Jerusalem both by Nebuchadnezzar and Titus; the 3d of the seventh month (Tishri), when Ishmael had killed Gedaliah, the Jewish governor appointed by the Babylonians (Jer. xli. 2); the 10th of the tenth month (Tebeth), in remembrance of the siege of Nebuchadnezzar; the 13th of the twelfth month (Adar), the F. of Esther, and the day most rigorously kept, next to the great day of atonement:—the 9th of the fifth month (Ab), the anniversary of the destruction of the first temple by Nebuchadnezzar, and of the second by Titus. That the people had at all times been prone to attach great importance to the use of this penance as a visible sign of outward contrition, is clear from that ordinance of the Mosaic law which puts into the hands of the head of a family the power of confining self imposed vows of abstinence within due limits. The community loved to express their penitence for sin, or their grief on the death of great men, by occasional fastings. They were also considered an efficient means of averting the divine wrath, of insuring victory over an enemy, or of bringing down rain from heaven. Besides, fasting was not unfrequently resorted to by those who wished to free their minds from all hindrances to meditation, as in the forty days of Moses (Exod. xxxiv. 28), or the F. of Daniel (Daniel, x. 2 and 3). This F. of contemplation, as it might be called, seems also to have been the model imitated by the cabalists, some of whom are known to have fasted from Sabbath to Sabbath. In later times, when, after the destruction of the temple, sacrifices had ceased, fasting, as causing a decrease in the flesh and fat of the individual, was considered to be in some degree a substitute for the animal which had formerly been offered up by the priest. From a means to repentance and inward purification, which purpose alone it had been originally intended to serve, it became an end and a virtue in itself; an abuse, indeed, neither unknown nor undenounced even in the days of the prophets. If we add to this the endless chain of dire calamities and ever-renewed persecutions of which the Jews have been the victims for many a long century, the ever-increasing number of their fasts commemorative of deaths and tribulations will be far from surprising. Most of these, however, which were superadded from time to time, soon fell into oblivion. Over and above the six already mentioned, but few entire days are now observed by the orthodox, and these merely of a local character. Fasting, with the Jews, always implies entire abstinence, and lasts, except on the day of atonement and the 9th of Ab—when the sunset of the previous evening is the sign for its commencement—from the break of the day to the appearance of the first three stars. Sackcloth and ashes, the garb of the penitent in ancient times, are no longer worn; but as the special holiness of the day of atonement is celebrated by various solemnities (see FESTIVALS), so the deepest mourning over the loss of temple and country is visibly expressed by many ceremonies in the Jewish synagogues and homes on the 9th of Ab. On that day also, to add the individual to the national sorrow, the cemeteries are generally visited. Of several half-days of fasting that have survived, we will mention the first two Mondays and the first Thursday in the second month (Iyar) and in the eighth month (Cheshwan), (sheni vachamishi vesheni), in celebration of the two meeting-points of summer and winter; as also, several days before the new-year or day of judgment, and before the day of atonement. The individual is bound to celebrate by fasting the anniversary of the death of his parents, his own wedding-day until the performance of the marriage-ceremony, and the birth of his first-born male child (up to its thirteenth year—when the duty falls upon the latter himself), on the day preceding the Pesach (Pasha)—in commemoration of the sparing of the Israelite first-born in Egypt. For the several hours' fasts on the two new-years' days, and on the first six days of the feast of tabernacles, we refer likewise to FESTIVALS, and we will only add in conclusion, that the Sabbath causes the postponement of any F.—that of the day of atonement only excepted—which may happen to be coincident with it; and that children—girls up to their twelfth, boys to their thirteenth year—pregnant women, and the sick, are exempted from the observance.

In the time of Christ, fasting, as we have seen, was held in high estimation. The Mondays and Thursdays—the market-days, on which the judges sat, and the law was read in the synagogues—were especially set aside for this purpose by the Pharisees. The Essenes fasted even more frequently. The Sadducees alone took exception to this rite, and were therefore considered ungodly. Christ himself neither approved nor disapproved of the custom, but, as in all matters of ceremony, allowed his disciples, Jews and Gentiles, to act according or contrary to their old habits. He is distinctly against such a *commandment*, and even excuses those who did not fast. His own abstinence from food for forty days was like that of Moses, entirely an individual act; and against a voluntary and limited imitation of such abstinence, to which the spirit might move a man, no objection whatever was to be taken.* During the first centuries of Christianity, these voluntary fasts were frequent enough; the new converts adhering in most cases to their old rite, and only taking care to change the days, which had been days of abstinence in their former religions, for others. Besides, they were considered a befitting preparation for holy acts and feasts, for ordination and baptism. The time mostly celebrated annually in common by all were the 40 hours from Friday afternoon to Sunday morning, during which time Christ lay in the sepulcher. But not before the end of the 2d c. was anything like an ordinance promulgated with respect to fasting in the new religion. It was first Montanus who, as the Paraclete, introduced, among other laws of excessive severity and rigor, fasting, as an inhibition upon the faithful. The Wednesdays and Fridays as the days when Christ was taken prisoner and crucified, were made days of strictest abstinence from all food; while on the other days of the week, dried, uncooked victuals only were allowed. Asceticism and monachism had their share in the gradual development of the doctrine of the necessity of mortifying the flesh, and as a natural consequence, in the growth and diffusion of the custom of fasting. Yet, in the first six centuries, the difference in the various Christian communities was not greater in any other doctrine or ceremony than in this. Bishops and councils, however, gradually fixed the times and seasons for the whole of Christendom. The 40 hours had gradually become 40 days, called the Quadragesima; and the council of Orleans, in 541, made it binding upon every Christian not to eat any meat during this time, save only on the Sundays.† The eighth council at Toledo, in the 7th c., declared those who ate meat during Lent, sinners unworthy to partake in the resurrection. From the 8th c. to the 11th, when a gradual reaction set in, the laws of fasting and the punishments awarded to the transgressors became stricter and stricter; interdict and excommunication were among the penalties. By degrees they had become so numerous and different in kind, that they were divided into—1. Jejunium generale (a fast binding for all); 2. Consuetudinarium (local fast, etc.); 3. Penitentiale (atonement for all transgressions); 4. Votivum (consequent upon a vow); 5. Voluntare (for the better carrying out of an undertaking). These, again, were kept either as—1. Jejunium naturale (an entire abstinence from food or drink, especially in preparation for the reception of the Eucharist); 2. Abstinentia (certain food only being allowed, but several times a day); 3. Jejunium cum abstinentia (the same food, but which must be taken once a day only); and 4. Jejunium sine abstinentia (all kinds of food, but only once a day). The food prohibited on partial fast-days included, during certain periods, not only the flesh of quadrupeds, fowl, and fish, but also the "lacticinia"—i.e., all that comes from quadruped and bird, as butter, eggs, milk, etc. We cannot here enter into detail; the discrepancies and differences of opinion with respect to the times and modes of fasting, or to the food prohibited, being, even among successive popes and contemporary bishops and elders of the church so numerous, and involved in such obscurities, that the church historians themselves shrink from enumerating them. Suffice it to say, that they gradually developed in the Roman church into—1. Weekly fasts, of which Friday, as the day of the crucifixion, seems to have been early and generally observed. To this was added the Wednesday, as the day on which the death of Christ was resolved upon. These two days received the name of stations; a term borrowed from the *stationes* of the Roman soldiers, in accordance with the views held by the ascetics and monks, that they were

* Roman Catholics, however, maintain that all the words of our Lord, which to Protestants appear to discountenance the obligation of fasting, are directed exclusively against the ostentatious and self-reliant fasts of the Pharisees. They even understand the language which he used in condemning the practice of the Pharisee fasters, as containing a direct exhortation to his own disciples—not that they should abstain from fasting—that they should fast with suitable dispositions. They hold, moreover, that in exempting his disciples from fasting, he had regard only to the actual time of his own presence among them. It was incongruous, he said, that the children of the marriage should fast as long as the bridegroom was with them; but, he added, "the days will come when the bridegroom shall be taken away from them; *and then they shall fast in those days*" (Mark iii. 20; Matt. ix. 15). Hence they infer, that from the time of our Lord's ascension the practice of fasting became obligatory on his disciples, the temporary cause of the exemption hitherto existing having ceased.

† It is only just to add, however, that here again Catholics dissent strongly from the Protestant view of this history. They admit that the followers of Montanus did introduce greater rigor and frequency into their fasts; but they deny that before the time of Montanus the practice of fasting was not fully recognized in the Christian church, and regarded as strictly obligatory. The very earliest allusions to the 40 days' F. of Lent (*tessaracosté*) regard it as an established and recognized institution. The very first fathers who allude to it, speak of it as "handed down and observed by the church;" and so far its origin from being ascribable to the influence of Montanism, that, on the contrary, the earliest relaxations which the church admited were a reaction against the excessive and intolerable rigor of that fanatical sect.

the warriors of Christ. At a synod in Spain in the beginning of the 4th c., the Saturday was superadded, but this innovation met with great opposition, especially in the east, where Jewish notions regarding the Sabbath had obtained a more permanent recognition. 2. Vigils, originally night-services observed by the first Christians on the eve of Sundays and festivals, partly in imitation of the Jewish custom of celebrating the entrance of the Sabbath and of festivals on the evening of the previous day, and partly in fear of the danger to which a service in the day-time would have exposed the early converts. Although these night-services became unnecessary in the course of time, they were still continued up to the 4th c., when, owing to the abuses to which they led, they were abolished, or rather transformed into fast-days, kept on the eve of great festivals in honor of Christ, Mary, saints, and apostles. 3. The great or 40 days' F. (Quadragesimal F.), the most important and most rigorously enforced of all. The 40 hours of F., in commemoration of the 40 hours during which Christ's body lay in the tomb, gradually expanded to 36, or rather 40 days, as mentioned before, in pious allusion to the 40 days of Moses, Elijah, Christ, the 40 years' sojourn in the desert, or the 40 camps —all considered typical—and the fasting became severer the nearer Passion-week itself approached, in which many other signs of mourning and contrition were generally exhibited. 4. The Quatember fasts on the Wednesdays, Fridays, and Saturdays in one week of each season, in imitation of the four Jewish fasts in the 4th, 5th, 7th, and 10th month.—There were still many other fasts, such as those of ordination, etc., but as they had only a temporary existence, we cannot treat of them here Nor can we enter into the various dispensations granted by the church, or the special pastoral letters generally issued before Quadragesima, nor into the variations in the observance of fasts and fasting in our own days; we can only add, that they have in a great measure lost their former severity, and that only partial abstinence is the rule in all cases. The opinion held by the church in former days, that fasting is meritorious, and conducive to the salvation of the soul, has undergone no change.

With respect to the Greek church, we have to observe that fasting was and is kept with much greater severity, the non-observance of it being the least venial of sins. The days here extend over almost three quarters of the year. The principal ones are the Wednesday and Friday—with a few exceptions—throughout the whole year; the great Easter F. lasting 48 days; that of Christmas, 39 days; that in honor of the Virgin, 14 days; and that of the Apostles, beginning on Monday after Trinity, and extending to the 29th of June. Besides those smaller fasts of preparation, which correspond to the vigils of the Roman church, they have many more occasional fasts, which we, however, must omit here.

The church of England considers fasting a praiseworthy, but by no means obligatory custom. According to Hook's *Church Dictionary*, the distinction between the Protestant and the Roman Catholic view of fasting consists in this, that the Roman catholic regards the use of fasting as an imperative means of grace, the Protestant only as a useful exercise preparatory for the means of grace. In proof how much the church of England has left the question of fasting to the conscience and discretion of her members, it may be observed that she has neither defined the mode or degree of fasting, nor anywhere given a positive command to fast. It has been remarked that no bishop of the church of England has in an episcopal charge laid down fasting as a positive requirement. The days named by the English church as seasons of fasting or abstinence, are the forty days of Lent (q.v.), including Ash Wednesday and Good-Friday; the Ember (q.v.) days; the three Rogation (q. v.) days, and all the Fridays in the year (except Christmas-day), and the eves or vigils of certain festivals.

The Scottish almanacs contain lists of the *fast-days* of all the principal places in Scotland. These are generally one in each year, appointed by the kirk-session of the established church of the parish, or by concurrence of kirk-sessions in towns, but generally by use and wont fixed as to their date. The fast-day is always some day of the week preceding the *Communion Sunday*, or Sunday set apart in the Presbyterian churches for the dispensation of the Lord's supper. It is usually appointed as a day for "fasting, humiliation, and prayer." Business is generally suspended, shops shut as on a Sunday, and churches opened for public worship. By an act of parliament passed not many years since, factories are prohibited from carrying on work on the parish fast-day, but in consequence of the ecclesiastical divisions in Scotland, it has become more common than it once was for agricultural and other kinds of work to be carried on. The fast-day of a large town is always a busy day on the railways, many taking advantage of it for excursions, and making it a day of amusement; too many, also, a day of dissipation and revelry. That it is right to keep up the fast-day in these circumstances is doubted by many who themselves conform to its religious observance, although of that observance *fasting* does not now generally form a part. Many, however, doubt if it ever was a good institution; alleging that it is inconsistent with the frequent celebration of the Lord's supper, which they deem right and desirable, and to which there is a growing tendency. The Scottish reformers, as appears from the *First Book of Discipline*, contemplated the ordinary celebration of the Lord's supper at least once a month; and the fast-day, as it now exists in Scotland, derives its origin from a later period.

A few words remain to be said of the Mohammedan fasts. Islam, as an offspring

of Judaism and Christianity, adopted this custom, with many others, from both churches. During the whole month of Ramadan, in which the prophet brought the Koran from heaven, eating, drinking, smoking, smelling perfumes, etc., are strictly forbidden from daybreak till sunset; for the intervening nights, however, all these restrictions are removed. There are, besides, many voluntary fasts, expiatory like the 10th of Moharram, corresponding to the Jewish day of atonement, or for the averting of the Divine wrath in sudden calamities, or as an indemnification for the omission of certain pious acts, as the pilgrimage, etc. See JEWS, MOHAMMEDANISM, MONKS.

Besides the *Bible*, *Schulchan Aruch*, *Koran*, and the fathers generally, we refer to the following authorities on this subject: Bingham, *Orig.*, vol. ix. 1, 21; Fabricius, *Bibliogr. Antiquaria*, c. 11; J. A. Muratori, *De Quatuor Temporum Jejuniis*, etc.; J. Dallœus, *De Jejuniis et Quadragesima*, 1654; Schöne's *Geschichtsforschungen*, Th. 1; *Briefe über d. Gottesd. d. morgenl. Kirche*, von Dr. E. v. Muralt (Leip. 1838); Siegel, *Altchristl. Alterthümer;* Dassel, *De Jure Tempor. Quadrages.*, 1617; Walch, *De Jejunio Quadragesimali* (Jenæ, 1727); Homborg, *De Quadragesima Veterum Christianorum et ritibus in ea quondam usitatis diss. qua etiam de recentior. Papist., Græc., Russ., Syrian., Georgian., Maronit., Jacobit., etc., disseritur* (Helmst., 1677).

Fasting, or deprivation of food, is, in a physiological sense, a state inconsistent with the continuance of life in most warm-blooded animals more than a few weeks. If water is not supplied, the period is much shorter, being in man commonly not more than a very few days, or at most a week. Persons have been found in coal-pits and mines, and in other situations where access to food has been impossible, but where water could be had, as long as six weeks after their seclusion, still alive, though of course in a very feeble condition; and a very small daily allowance of food has supported life longer than this, as in some cases of shipwreck, and other accidents at sea. Cases of alleged fasting, longer than this, as in the notorious woman of Tutbury, are certainly in most instances due to imposture. The insane would appear, in some instances, to bear fasting better than the healthy. Hibernating animals (see HIBERNATION) are capable of sustaining the want of food for an apparently indefinite period of weeks during the winter sleep; but no warm-blooded animal can endure fasting in anything like the same degree as the reptiles, in many of which, indeed, the natural state of existence is one of long intervals between the times of taking food, and in which the vital change of texture is remarkably slow. Thus, the remarkable amphibious animal, the *Proteus anguinus*, has been known to live for years without food, and the same is true of salamanders, tortoises, and even goldfishes. In fasting, the body gradually emaciates, most of the secretions are arrested, or greatly diminished, and at last the animal heat falls rapidly in all parts of the body. In attempting the recovery of persons reduced by fasting, food must be given in very small quantities at a time, and of the most nourishing and digestible quality; stimulants should be either withheld, or very cautiously administered. The most important point, next to the regulation of the food, and sometimes even before food is given at all, is the removal of the torpor and chill of the body by gradually applied heat, with friction of the limbs. See Tiedemann's *Physiology;* Burdach's *Physiology;* Chossat, *Recherches sur l'Inanition.*

FASTEN'S EVE. See SHROVETIDE.

FASTI. *Fas*, in Latin, signifies divine law, and *fastus*, anything in accordance with divine law. Hence the *dies fasti*, or lawful days, among the Romans, were the days on which it was lawful to transact business before the prætor. But the sacred books, in which the lawful days of the year were marked, were themselves denominated *fasti*, and the term was employed, in an extended sense, to signify various kinds of registers, which have been often confounded with each other. These registers fall into two principal divisions—the F. Sacri or Kalendares, and the F. Annales or Historici.

1. *Fasti Kalendares*, or calendars of the year, were kept exclusively by the priests for about four centuries and a half after the building of the city. The appearance of the new moon was proclaimed by a pontifex, who at the same time announced to the people the time which would intervene between the calends and nones. See CALENDS, also CALENDAR. On the nones, the country-people assembled for the purpose of learning from the Rex Sacrorum the various festivals of the month, and the days on which they would fall. In the same way, those who intended to go to law, learned on what days it would be right (*fas*) to do so. The mystery with which this lore was surrounded, for purposes of power and profit, by the favored class, was dispelled by Cn. Flavius, the scribe of Appius Cæcus, who surreptitiously copied from the pontifical book the requisite information, and published it to the people in the forum. From this, time-tables (*fasti*) became common, very much resembling modern almanacs. They contained the days and months of the year, the nones, ides, lawful and unlawful days, etc.; astronomical observations on the rising and setting of the fixed stars, the commencement of the seasons, brief notices concerning the introduction and signification of certain rites, the dedication of temples, the dates of victories, disasters, and the like. In later times, the exploits and honors of the imperial family were duly entered in the calendar. The celebrated *Fasti* of Ovid is a sort of poetical companion to the calendar, as published by Julius Cæsar, who remodeled the Roman year.

Several very curious specimens of F. on stone and marble have been discovered, of

which one of the most remarkable is the Kalendarium Prænestinum, which stood in the lower part of the forum of Præneste, described by Suetonius. Of these ancient F., eleven are enumerated by Foggini, a learned Italian antiquary. One of the most interesting is a rural almanac, known as the Kalendarium Rusticum Farnesianum. It is cut on four sides of a cube, each side of which is divided into three columns, each column embracing a month. The various agricultural operations to be performed in each month are given on this curious relic, in addition to the ordinary information contained in these calendars. In the month of May, for example, the rustic is told that his corn must be weeded, his sheep shorn, his wool washed, etc.

2. *Fasti Annales or Historici* were chronicles, containing the names of the consuls and other magistrates of the year, and an enumeration of the most remarkable events in the history of Rome, noted down opposite the days on which they occurred. From its application to these chronicles, the word F. came to be used by the poets as synonymous with historical records. A very interesting specimen of F. of this class was discovered in the forum at Rome in 1547. The fragments into which it had been broken were collected and arranged by the cardinal Alexander Farnese, and placed in the capitol, where they may still be seen, together with some additional portions which were discovered in 1817 and 1818. See Smith's *Dictionary of Greek and Roman Antiquities, voce* "Fasti," and also the article on "Calendar" (Roman) in the same work.

FAST AND LOOSE is the name of a cheating game, also called *pricking at the belt*, which appears to have been much practiced by the gypsies in the time of Shakespeare. The following is a description: "A leathern belt is made up into a number of intricate folds, and placed edgewise upon a table. One of the folds is made to resemble the middle of a girdle, so that whoever shall thrust a skewer into it would think he held it fast to the table; whereas, when he has so done, the person with whom he plays may take hold of both ends, and draw it away." The game is still practised at fairs, races, and similar meetings under the name of *prick the garter;* the original phrase, "fast and loose," however, is now used to designate the conduct of those numerous slippery characters whose code of ethics does not forbid them to say one thing and do another.

FA'TA MORGA'NA is a striking kind of mirage observed in the strait of Messina. A spectator on the shore sees images of men, houses, ships, etc., sometimes in the water, sometimes in the air, the same object having frequently two images, one inverted. See MIRAGE.

FATE—FATALISM, express a conception which has more or less prevailed in all religions. The words are derived from the Lat. *fatum,* which has primarily a passive signification, denoting something uttered—a decree or ordinance. The Greeks expressed the same thought by *eimarmenê. Moira,* again, was the active personification of the idea—the goddess of fate or destiny. It represented, in the Greek mythology, the final monotheistic element—the vague unity binding together and dominating over the crowd of Olympian deities. In Homer, *Moira* has a double meaning, appearing sometimes as superior to the will of Zeus, and sometimes as inferior to this will. With the course of Grecian thought, the conception of fate became more spiritualized. In Æschylus it is an inexorable destiny; in Sophocles and Plato, it is more of a free and ordering will. In the latter forms of Greco-Roman speculation, again, it undergoes various modifications. With the Epicureans, it seems identical with chance (*tuchê*); with the Stoics, it is the very opposite of this. In the one case, the absolute is a mere blind fatality; in the other case, it is an imminent necessity of reason, governing with iron sway the apparently accidental phenomena of life.

In the two great religions of modern times, Christianity and Mohammedanism, the same conception is found in various forms. In the latter, the highest is conceived as an arbitrary and inexorable law, swallowing up every lower law of activity, and permitting no scope to freedom of development in human nature. In Christianity and the modern speculation which it has colored, it shows itself less broadly in the well-known doctrines of predestination and of philosophical necessity. In the predestination theory of Augustine, Calvin, and many others, the old fatalistic doctrine is repudiated; the recognition of a free determining element in the divine will, separates their idea of it altogether from that of a mere blind destiny; but the influence of the mode of thought out of which the old idea sprung, appears in the manner in which the divine decrees are sometimes spoken of as inexorably overbearing human freedom. In the doctrine of philosophical necessity promulgated by Leibnitz, Edwards, and in a somewhat different form by modern positivism, the same idea emerges under the name of inevitable sequence—of an invariable connection linking together all phenomena material and mental. An immutable law is declared to pervade and harmonize all existence. This is a much higher conception, but it is not difficult to see how easily it may pass into the old pagan doctrine of fate.

The doctrines of predestination and of philosophical necessity have been supposed mutually to support each other; in reality, however, they are very different doctrines. The one starts from the dominating conception of the divine will as overruling all things, and approaches fatalism by ascribing in certain cases such an absorbing energy to this will as to leave no power of free action to any other will. It conceives of everything as swallowed up in the single omnipotence of the divine. It is *pantheistic.* The

other starts from the dominating conception of law in nature, and approaches fatalism by investing this law with an immutable and self-subsistent character. It looks at all existence as a mere undeviating routine of development, and tends in exact opposition to the other doctrine, to shut out the divine behind the screen of the natural. It is *atheistic*. It is, of course, merely the tendency of the respective speculations that is thus characterized.

The conception of fate springs irresistibly from man's consciousness of the transcending greatness of what is outside and above his own feeble existence—of the objective power that incloses and molds his own subjective activity. As such, it will never wholly disappear from human speculation, however endlessly modified it may be.

FATES. See PARCÆ.

FATHER. See PARENT AND CHILD, FAMILY, PATRIA PROTESTAS.

FATHER-LASHER, *Cottus bubalis*, a very common fish on the British coasts, the most spiny of the British species of *cottus* (q.v.), and particularly armed with strong spines on the back of the head—which is large—and on the gill-covers. When touched, it distends its gill-covers, sets out its spines, and assumes a very threatening appearance. Its general aspect is indeed forbidding, and even the little boys who angle from the rocks and pier-heads are usually averse to touch it, although it is said to be wholesome and agreeable food. It is of a brown color above, whitish beneath, curiously marbled and spotted, the fins marbled black and white. In Scotland, it bears the name of *lucky proach*.

FATHERS OF THE CHURCH (*patres ecclesiastici*), certain early writers of the Christian church. The term abba, Græcized ἀββας (father), in use among the Talmudists as a synonym of rabbi (my master), and constituting, according to Maimonides, the third or lowest honorary title of a doctor of the divine law, was in the first centuries of Christianity applied indiscriminately to all theological writers who were distinguished by their learning, genius, or piety. Gradually, however, the word father, or, more fully, father of the church, was confined to those teachers whose writings were considered pre-eminently orthodox, and who might be looked upon as the *progenitors*, as it were, of certain dogmas, upon the development of which they had exercised a more or less direct influence; while those writers who diverged into the fields of heretical opinion were called *scriptores ecclesiastici* (church-writers). Out of the number of the former, some few master-minds, to whom the church owed a still greater tribute, were again singled out as *doctores ecclesiæ* (doctors of the church), which title of pre-eminence, however, is bestowed on many writers who lived subsequently to the time of the fathers, in consideration of their "purer and more excellent doctrine" (Benedict, xiv., *Bulla, Milit. Eccles.*).

The temporal limits within which the fathers are to be confined, as well as their proper share of authority in matters of faith, have long been points of grave discussion. While some include the fathers of the 1st c., generally called the apostolical fathers, on account of their being the contemporaries or disciples of Christ and the apostles, they are excluded by others; again, by some, the 7th c. is made the closing period, while others carry the list down to the 12th, or even the 13th century.

With respect to the authority of the fathers, some, like Fredegis, held their words to be as sacred as those of the prophets and sacred writers; while others, like Alphonso di Castro, Melelius Cano, and cardinal Cajetan, ridiculed the notion that Symmachus should be made equal to St. Paul, or Didymus to St. John the evangelist. Others, again, like pope Gregory and the majority of writers, took the middle course of regarding them not as infallible, much less as prophets and apostles, but held that, when in matters of faith the most perfect and unswerving unanimity reigns among them, then only, the Holy Ghost is to be considered to speak through them. See RULE OF FAITH; INFALLIBILITY.

Immense as is the range and variety of their writings, ascetic, apologetic, polemical, exegetical, moral, historical, or dogmatical, so also is the diversity of their individual value. Nothing can be further from historical justice than either the wholesale laudation or condemnation of these writers as a body; but whatever stand we may take, we cannot but see that they are of the utmost moment. Stretching as they do over the entire extent of that period which forms the turning-point between the antique and modern world, they faithfully and often unconsciously portray that awful change, of which they were in no small degree the instruments—the gradual wane of old faiths, and of an old civilization, and the slow and struggling rise of that which was to replace them; while they preserve the most minute and trifling details with the same accuracy as the most momentous event, as each happened to bear upon their subject. The philosopher, the historian, the antiquary, each and all will find their writings, as a whole, to contain an inexhaustible fund of instruction. Of no less interest, perhaps, are their works in relation to the writers individually. These, issuing from all parts of the then known world, from all ranks, all creeds, could not but impress the stamp of their nationality and callings, besides that of their youth or age, vigor or feebleness, upon their writing—Jew, Greek, Roman, African, Spaniard—orator, poet, lawyer, statesman, priest, they all bring with them that which was their own before they

embraced the new faith: their dialectic power, their fantastic poetry, their graceful speech, their stern austerity. What Greek subtlety did theoretically for the development of dogma in Origen and Athanasius, that Roman thoroughness did practically for the erection of the hierarchy in Leo the great and Gregory III.; while from Egypt came asceticism and monachism, the ascendency of spiritualism over sensualism is owing to those who came from the northern coast of Africa. How far Platonism, and especially Neoplatonism, Aristotle, and Greek philosophy generally, are found developed in these works, and infused into the new faith by the former teachers of the academies themselves, who mostly retained their old philosophical garb, upon this, as well as upon many other points, we must forbear to enlarge.

We will now proceed to take a brief survey of these writers—referring for further information to the special articles on the more eminent among them. According to the now generally adopted method of dating them from the 1st to the 7th c., they are divided into two distinct periods, the first of which goes down to the council of Nicæa, 325 A.D. Of those who head the list, the apostolic fathers—so called from their supposed connection with Christ and the apostles—very little need be said, as their writings, which are mostly of an ascetical character, have come down to us in a corrupt and mutilated state, and as the writers themselves owe their chief celebrity to the times in which they happened to live. We have here Barnabas, the son of Teostes, and the companion of St. Paul (Acts ix. 27; xii. 25); Clement, supposed to have been the third bishop of Rome; and the Clement mentioned by St. Paul (Philipp. iv. 3); Hermas, identical perhaps with the Hermas of St. Paul's Epistle to the Romans (xvi. 14); Ignatius, bishop of Antioch; Polycarp, bishop of Smyrna; Papias; Dionysius the Areopagite, etc. Next follow the apologists, or those fathers whose chief aim was the defense of the new faith against the Roman state, and non-Christian authors, and who were the first to make their scientific culture, and more especially the Platonic philosophy, subservient to Christianity, for this purpose: Quadratus the "evangelist," a traveling missionary; Aristides, an Athenian philosopher; Justin Martyr, the well-known author of the two Apologies and the Dialogue with Trypho (or rather Tarphon); Tatian of Assyria, who, having examined the different forms of worship, as well as the systems of philosophy prevalent in his time, felt satisfied with none but Christianity, and became a disciple of Justin, and a vindicator of the philosophy of the barbarians; Athenagoras, who addressed his apology to the emperor Marcus Aurelius, and his son Commodus, and wrote a Defense of the Doctrine of the Resurrection; Theophilus, bishop of Antioch; Miltiades, etc. Next come the church fathers of Asia Minor, men of more practical and peaceful tendencies: Hegesippus, perhaps an Ebionite; Irenæus, bishop of Lyons and Vienna, who wrote a refutation of the Gnostic system; Hippolytus, his disciple, of unknown birthplace and renowned name. In the North African church, the development of which is of the utmost moment, inasmuch as its language, dogmas, and laws were adopted by the greater part of the Christian world in the west, we find Tertullian of Carthage, the rhetorician and advocate, a man of profound mind and vast influence; Cyprian, the author of the *Testimonies* in favor of Christ; Commodian, the writer of the *Rules of Living;* and Arnobius, a rhetorician of Sicca, in Numidia. The first comparatively barren, though otherwise highly important church, is the Roman. The pre-eminently practical Roman mind looked more to the outward growth and well-being of the church than to literary excellence, and thus we have only two distinguished authors to be noticed here—the presbyter Caius, known as an opponent of the Montanists; and the presbyter Novatian, who wrote a treatise on the Jewish laws respecting food. The church which, more than any other, endeavored to combine speculation with faith, and which gradually became, through its high degree of culture and erudition, the very center of Christianity, is the Alexandrian. And here we have Pantænus; Clement the Alexandrine, chiefly known by his Stromata or Elements of the Gnosis; Origen, called Adamantinus, the eminent Neoplatonist, born 185 A.D., in Alexandria, one of the most influential writers of the whole Christian church; Herculas, with his disciple Dionysius, a liberal and moderate man; Gregory, the worker of miracles; Pamphilus and Julius Africanus, the first Christian chorographer.

In the second period, which dates from the Nicæan council, and comes down to Gregory II., 604 A.D., a period altogether superior, on account of the great number of intellectual and erudite men who devoted their lives and labors to the church, we have to distinguish the Greek from the Latin fathers. Among the former, we have again to draw a line between those of the Alexandrine school—like Eusebius Pamphili, the Heredotus of the church; Athanasius, the father of orthodoxy; Basil the great, doctor ecclesiæ, and his brother Gregory of Nyssa; Gregory of Nazianzen, called the theologian, by way of eminence; Didymus; and Cyrillus, some time patriarch of Alexandria, the chief prosecutor of Nestorius—and those of the Antiochian school, where we find Ephraem Syrus, "the prophet of the Syrians;" Cyril of Jerusalem, the converted Arian; John Chrysostom, of brilliant eloquence; Diodorus, bishop of Tarsus, one of the chief founders of the Antiochian school; and Theodoretus, bishop of Cyrus. Besides these, we find, of Greek fathers who belonged to neither school—Epiphanius, the violent adversary of Origen; Socrates Scholasticus, the continuator of Eusebius's *Ecclesiastical History;* Philostorgius, an Arian church historian; Logomenus; Evagrius; Macarius the elder, chiefly known through his miracles and combats with the devil; Procopius of

Gaza, the rhetorician; and Joannes Scholasticus, famous through his collections of canonical law. Among the Latins, we have to enumerate first the African fathers Fabius Victorinus; Augustine of Tagaste in Numidia, the greatest dogmatist of the western church; pope Gelasius I. (492–96), who finally fixed the canon of the Bible for the Roman church; and the bishops Fulgentius, Junilius, and Facundus. Of Spaniards, we have Prudentius the poet; Paulus Orosius, whom Augustine used as his messenger to the east in his controversies with Pelagius. Of Gauls there are Hilarius Pictaviensis, bishop of Poitiers about 350, the Athanasius of the west; Paulinus of Nola; Sulpitius Severus, friend of Martin of Tours; Vincent of Lerins, once a soldier, who wrote under the name of Peregrinus; Sidonius Apollinaris, bishop of Clermont; Gennadius, the author of an ecclesiastical literary history; Ennodius from Arles, who exerted himself to unite the eastern and the western church; and Gregorius Turonensis, who wrote *Historia Ecclesiastica Francorum*, the basis of Frankish history. From other countries we have Sedulius, an Irishman; Joannes Cassianus, a Scythian; and Mercator, of unknown birthplace. We conclude with the Italians themselves: Lactantius Firmianus, the Christian Cicero; Julius Firmicius Maternus of Sicily; Ambrose, metropolite of Milan, who raised his see to such a power that it dared to resist Rome herself up to the 12th c.; Rufinus of Aquileia, defender of Origen against the charge of heresy brought against him in the west; Eusebius Hieronymus, undoubtedly the most learned of all the Latin fathers, and who mastered also the Greek and Hebrew languages, collected in Palestine the most valuable notes for the elucidation of the Scriptures, and also corrected the Latin edition of the Vulgate; pope Leo I.; Boëthius; Aurelius Cassiodorus, whose *Historia Tripartita*, in twelve books, served for a thousand years as a compendium of ecclesiastical history; the two poets, Arator and Venantius Fortunatus; and pope Gregory I. (509–604), is regarded by Protestants as having first given the western church its peculiarly Roman Catholic stamp by developing the idea of the eucharist into a theophany, and making it the center of the worship. His works, especially his letters, are invaluable for the study of his own times, especially for the history of the conversion of the west.

On the MSS. of the fathers, we refer to *Petri Lambeccii Commentarii de Bibliotheca Cæsareâ Vindobonensi*. The editions of the works of the fathers are of two classes—those of the individual fathers, whose writings are the most voluminous and of highest dogmatical importance, and the general patristic collections, which comprise the writings of the less voluminous or minor fathers. In the former class, the first place, beyond all dispute, belongs to the celebrated Benedictine editions, by the members of the great Maurist congregation of the French Benedictine order (see BENEDICTINES), of which community the task of editing the fathers came to be considered as the recognized work. The Benedictine editions of the greater fathers, with the exception of two or three, still maintain the very highest place in the estimation of the learned. Of the collections of the works of the fathers, the most important are those of La Bigne, Galland, Rössler, Walch, Zimmerman, and Migne. Reference may also be made to cardinal Mai's *Bibliotheca Patrum*, *Spicilegium Romanum*, and *Classici Auctores*, and to the *Spicilegium Solesmense* of the Benedictines of Solesme. Translations of the principal fathers are numerous. The chief works upon the more important fathers are noted under their several names.

FATHIPUR, or FUTTEHPOOR, a district in the Allahabad division of the n.w. provinces of British India, in the s.e. corner of the tract between the Ganges and the Jumna; 1586 sq.m., pop. 72, 663,877, of whom 593,256 were Hindus, 70,554 Mohammedans, and 5 Christians. The district is an alluvial plain formed by the deposits of the two rivers. There are two harvests in a year, the autumn crop consisting principally of rice, and the spring crop of wheat, barley, etc. The East India railway runs through the district.

FATHOM, a measure of six feet, principally used in reference to marine soundings, and in mines. Originally, a fathom was taken as the width to which the two outstretched arms extended.

FA'TIMIDES, or FA'TIMITES, the name of an Arabian dynasty which reigned for nearly two centuries over Egypt. Its founder was Mahadi-Obaidallah, who flourished from 910 to 934 A.D. He asserted that he was descended from Fatima, the daughter of the prophet, and Ismael, a grandson of Ali. He thus won over to his side all the adherents of the widely diffused Ismaelites, an extravagantly schismatic sect of Mohammedans in Africa, and overthrew the race of the Aghlabides, who ruled at Tunis. His successor extended his dominion as far as Fez, and his descendant Moëzz, in the year 970, conquered Egypt, expelled the reigning family, removed his court thither, founded Cairo, assumed the title of caliph, thus proclaiming himself the lawful successor of the prophet, and subdued Syria and Palestine. After the death of Moëzz, the F. maintained their high position for some time; but gradually degenerated, and resigned all the cares of government into the hands of their viziers. Their power now rapidly declined, and their vast territories melted away. In religious matters, the F., because they were raised to power by the followers of Ali, took upon themselves the protection of the Shiite sect, and the establishment of the Ismaelitic doctrines. Between the years 1002–21, the caliph Hakem-Biamr-Allah persecuted the orthodox Mohammedans or Sunnites, as

well as Jews and Christians. He founded an academy at Cairo, and endowed it largely, but connected with it a secret society for the diffusion of Ismaelitic opinions. In the first stages, the novice was shown the untenable nature of the precepts of the Koran; in the sixth, the advanced student found that religious legislation must give way to the claims of philosophy; in the seventh, a mystic pantheism was proved to be the true philosophy; and finally, in the ninth, the initiated discovered that he was not required to believe anything, and might do whatever he pleased. His system, with considerable modifications, found a home among that peculiar people the Druses (q.v.). After the death of Adhid, the last of the F., in 1171, the founder of the dynasty of the Ayubides, Salâh-ed-dîn (Saladin), took possession of Egypt.

FAT LUTE is the term applied to a composition of linseed-oil and pipe-clay. See LUTE.

FATS are those oily substances which are solid at ordinary temperature. They do not differ essentially from the liquid oils. See OILS.

FATS, ANIMAL. There is considerable difference of opinion amongst chemists regarding the exact nature of the fats occurring in the animal body. According to most chemists, they are composed of an admixture of three separate fats—margarine, stearine, and oleine, of which the two former are solid, and the latter fluid, at ordinary temperatures. Heintz, who has carefully studied these bodies, declares, however, that margarine is not a simple fat, but a mixture of stearine and palmitine (a solid fat occurring in palm-oil); and he considers human fat to be a mixture of stearine, palmitine, and oleine. For the chemical characters of these substances, we refer to the articles MARGARINE, OLEINE, PALMITINE, and STEARIC ACID, and we proceed to the consideration of the physiological relations of the fat.

Fat, usually inclosed in vesicles, is found very extensively in the animal kingdom. It is abundant in many larvæ, and occurs more scantily in most insects. It is met with in the mollusca, and is comparatively abundant in all the divisions of the vertebrata. In most fish, it occurs throughout the body, but is especially abundant in the liver, where it is found in the hepatic cells, and not in its own characteristic vesicles. In reptiles, it chiefly exists in the abdomen. In birds, we especially find it about the peritoneum, and under the skin. In mammals, it is very generally diffused, but the greatest quantity is under the skin, in the omentum, and round the kidneys.

The quantity of fat in the human body varies considerably at different periods of life. In the earlier stages of fetal existence, we find scarcely any fat; in new-born children, there is usually a considerable quantity of this substance deposited under the skin, and the organism continues rich in fat till the age of puberty, when a marked diminution of the substance occurs. It again increases about middle life, and then occasionally occurs in great excess; for example, 3 or 4 in. of fat are not unfrequently found under the skin of the abdomen in corpulent persons.

Extraordinary deposits of fat in some particular part of the body are observed in certain races of men and animals. One of the most remarkable examples of this peculiarity is afforded by the Hottentot women, in whom the fat accumulates in the gluteal region to such an extent as to give a most remarkable prominence to that part of the body; and a somewhat analogous deposit exists in a variety of sheep (*ovis steatopyga*, the fat-buttocked sheep), in which a large mass of fat, sometimes attaining a weight of 40 lbs., is developed on the buttocks, and takes the place of a tail.

The origin of the fat in the animal body must undoubtedly be chiefly referred to the fat taken with the food. It has, however, been proved by the most careful investigations on various animals submitted to the process of fattening, on bees fed with cane-sugar, or with honey containing scarcely any wax, and on the larvæ of the insects inhabiting galls, that the animal, like the vegetable organism, has the power of forming or producing fat, far more fat being found, in these experiments, in the body of the animal, than could be referred to the fat taken in the food. The excess must therefore have been formed either from the non-nitrogenous portion of the food, such as starch and sugar; or from the nitrogenous matters, such as fibrin, albumen, etc. In the case of the bees, it was distinctly proved that the fat was formed from sugar; while in the case of the larvæ of the gall-insect, it was similarly shown that it was produced from the starch which forms the interior of the gall in which the animal lives; and as we have no corresponding evidence of the convertibility of fibrin, albumen, etc., into fat (although such a conversion is by no means improbable), we must for the present regard the non-nitrogenous foods as the chief fat-formers next to fat itself.

The physiological value of the fats is partly due to their physical, and partly to their chemical characters.

The uses of the fat deposited beneath the skin are, first, to protect the body from external shocks by a uniform diffusion of pressure through the whole adipose tissue; and, second, to keep up the heat of the body, by materially checking, through its very slight conducting power, the loss of free heat by radiation. This use of the fat is most clearly seen in some of the lower animals (the seal, whale, etc.), which are exposed to very low temperatures.

Another physical use of fat is to promote the mobility of various organs. Hence, in

cases of extreme emaciation, it always remains in the parts where motion is most essential, as the heart, and the orbit of the eye.

Another of its important physical properties is that of rendering other bodies supple, and diminishing their brittleness. In this point of view, the use of fat is very conspicuous in the bones.

The chief chemical use of the fat is its power of exciting and supporting the animal heat. In the oxidation of the fats in the animal organism, whether the process be gradual or rapid, a large amount of heat must necessarily be liberated; and that they are oxidized, and for the most part reduced to carbonic acid and water, is evident, because they neither appear in any quantity in the excretions, nor, as a general rule, accumulate beyond a certain point in the organism. An accumulation of fat thus serves as a reservoir of combustible matter in time of need. This is especially evident in the case of hybernating mammals, as, for example, hedgehogs, in which an enormous quantity is deposited just before the hybernating period: during this period, it gradually disappears, its carbon being slowly consumed in the respiratory process, and keeping up the animal heat.

Fat is, moreover, one of the most active agents in the metamorphosis of animal matter. Lehmann ascertained that a certain, although a small quantity of fat was indispensable to the complete gastric digestion of nitrogenous food, a fact which is confirmed by the observation that in experiments on artificial digestion, the solution of substances used as food is considerably accelerated by the presence of a little fat. The occurrence of fat in the milk and in the egg, as also in all highly cellular organs (as, for example, the liver), is a clear indication that this substance plays an important part in the process of cell-formation; and no animal cell or cell-yielding plasma has ever been observed in which fat is not a constituent.

An undue accumulation or increased growth of the fatty tissue gives rise to the condition known as obesity (q.v.).

FATTY ACIDS. See OILS.

FATTY DEGENERATION, a pathological term signifying the gradual replacement by fat-globules of the tissues of a living body, impairing and finally destroying them. These globules, though originating in the living tissues and existing among them, have in themselves no element of life; hence when they replace living tissues they are destructive of them. Fatty degeneration must be distinguished from obesity, which is simply excessive deposition of fat between the tissues. The disease, which is not regarded as curable, is of frequent occurrence, and it attacks nearly all the tissues, particularly the muscular and cellular, as in the heart and liver, which organs are often the seats of the disease. The red blood globules and the nerves are probably never attacked by it.

FATUITY, or DEMENTIA, consists in the impairment or extinction of certain mental powers, or of all. Esquirol has quaintly but descriptively said that the idiot and imbecile are poor who have never been rich, but that the fatuous or dements are rich who have been made poor. This impoverishment is sometimes so extreme, and the sufferer is so little influenced by consciousness as to lose a knowledge of his own existence; and so little by impressions through the external senses, and by the instincts of the sensory ganglia, as to be equally ignorant of the existence of others. Life is vegetative merely. This deprivation may be partial or complete. It may appear as a weakening of sensibility. This is not the tolerance of powerful or painful impressions, or indifference to such, springing from abstraction or engrossment of the attention, but positive extinction of perception; or it may present the more common form of enfeeblement of intelligence, of memory; of the will, where the patient is apathetic, passive, plastic. The disease may involve the affections and the moral sense, and abrogate the power of decision, and all spontaneity of action and thought. Incoherence in ideas and words may be made to constitute another form, although generally regarded as a characteristic; whether it amounts merely to forgetfulness, or to confusion or irrationality, to inconsecutiveness and inability to express instincts and wishes. Delusions and hallucinations may co-exist with these conditions, but like the real impressions received by this class of the insane, they are feeble, fugacious, and uninfluential. Under all these aspects, the essential element is privation of power; and this is met with as a specific mental disease, arising from obvious causes, unassociated with general alienation, acute in its nature, and rapid in its progress. It is most frequently the disease of youth, of the period of puberty, contemporaneous with growth, with debilitating and exhaustive processes, and depending, in all probability, as in the other forms, upon insufficient nutrition of the brain. At this age, the injury is reparable, and what may be designated juvenile dementia, has the rare distinction of being curable. More frequently, it is the sequel of mania, melancholia, and severe affections of the nervous system. The deterioration here arises from actual changes in the nervous structure, which render healthy nutrition impossible; so that, although mitigation, and sometimes to a marvelous extent, is within reach of treatment, recovery is believed to be impracticable. Again, it is an affection of old age; and although senile dementia may seem but an exaggerated state of dotage, it is accompanied by such marked physical changes, as to leave no doubt that it originates in circumstances differing widely from that gradual degeneration of the

tissues which is evidenced by the "second childishness and mere oblivion." Lastly, this state may follow fever, when it is transitory, and generally of brief duration.

F. is one of the few morbid mental conditions recognized in our legal code, even by name, as relieving from the consequences of criminal acts, and as disqualifying for the administration and disposal of property. Esquirol, *Des Malad. Ment.*, tom. ii. p. 219.

FAUCHER, Leon, a French publicist and statesman, was b. at Limoges, 8th Sept., 1803; studied at first philology and archæology, in which branches of knowledge he acquired some reputation; but about the period of the July revolution (1830), betook himself, with genuine enthusiasm, to journalism and political economy. He became successively editor of the *Temps*, *Constitutionnel*, and the *Courrier Français*. These functions occupied him from 1830 to 1842, during which period he published many articles on questions of political economy. In 1843, he began to write for the *Revue des Deux Mondes* a series of articles on the industrial condition of England. The whole were collected into two volumes, which appeared in 1845, under the title of *Etudes sur l'Angleterre*, and constitute the most weighty and substantial of all his productions, though Englishmen reckon the author greatly in error in many points. At the general elections of 1846, he was elected for the manufacturing city of Rheims, where his opinions on tariffs were highly appreciated. In the chamber of deputies, he voted with the dynastic opposition. A ready but by no means brilliant speaker, he came forward as one of the leading advocates of free trade, and published in the *Siècle*, and in the *Revue des Deux Mondes*, a number of essays on national economy, characterized by their vigorous and spirited argumentation. After the revolution of 1848, he sat both in the constituent and legislative assemblies for the department of Maine. When Louis Napoleon was chosen president, F. became first minister of public works, and subsequently minister of the interior; but when the president proposed to appeal to universal suffrage, F. gave in his resignation, and after the *coup d'état*, he withdrew from political life. F. died 14th Dec., 1854. A large number of his most valuable contributions to the science of politics will be found in the collection of the *Economistes et Publicistes Contemporains*, and in the *Bibliothèque des Sciences Morales et Politiques*.

FAULK, a new co. in central Dakota, 1000 sq.m.; organized since the census of 1870. It is mainly a table-land, drained by a branch of the Dakota river.

FAULKNER, a co. in n. Arkansas, on the Arkansas river, reached by the Little Rock and Fort Smith railroad; 650 sq.m.; formed since the census of 1870. Co. seat, Conway.

FAULKNER'S ISLAND, in Long island sound; off the harbor of Guilford, Conn. It belongs to New York, and has a light-house and a fog-bell.

FAULT, the term in mining and geology for any interruption in the continuity of the strata, coupled with the displacement of the beds on either side of the line of fracture. See Dislocation.

FAUN. Faunus was a mythical personage, an ancient king of Italy, who instructed his subjects in agriculture and the management of flocks, and was afterwards worshiped as the god of fields and of shepherds. The festival of the *faunalia*, held on the 5th Dec., referred to the protection he exercised over agriculture and cattle. Fauna was his female complement. He was also worshiped as a prophetic divinity. As deity of the woods and of flocks and herds, he corresponds to the Greek Pan. the idea also arose of a plurality of fauni or fauns, like the Greek satyrs, who were represented as monster deities with short horns, pointed ears, tails, and goats' feet, and to whom all terrifying sounds and appearances were ascribed.

FAUNA, a term employed to designate animals collectively, or those of a particular country, or of a particular geological period. Thus, we speak of the fauna of Great Britain, the recent fauna, the fossil fauna, the fossil of the eocene period or formation, etc. The term bears the same relation to the animal kingdom that *flora* does to the vegetable. Its derivation is from the mythological fauns, regarded as the patrons of wild animals. In the fauna of any country are included only those animals which are indigenous to it, and not those which have been introduced.

FAUQUIER, a co. in n.e. Virginia, between the Rappahannock and the Blue Ridge, intersected by the Virginia Midland and Great Southern railroad, and by the Manassas branch of that railroad; 680 sq.m.; pop. '70, 19,690—7,856 colored. Surface undulating, and to a large extent covered with forests. Productions, corn, wheat, oats, pork, etc. Co. seat, Warrenton.

FAUQUIER, Francis, d. 1768; for 10 years lieutenant-governor of Virginia. He was the successor of gov. Dinwiddie, and his administration was popular and prosperous. He published in London in 1757 *Raising Money for the Support of the War.*

FAURE, Jean Baptiste, b. 1830; a French vocalist, educated at the conservatoire, and made his first public appearance in 1852. In 1857, he was made professor of singing in the conservatoire. He has often appeared in opera in London.

FAURIEL, Claude Charles, a French philologist, historian, and critic, was b. at St. Etienne, in the department of Loire, 21st Oct., 1772, studied at the college des Oratoriens at Tournon, and afterwards at Lyon, and in 1799 was appointed to a situation

under Fouché; but, destitute of all political ambition or predilections, and passionately fond of learned studies, F. resigned his office in 1802, and devoted himself to the calmer pursuits of literature. He made himself familiar with Sanscrit, Arabic, and the treasures of classical antiquity and of the middle ages; and although he did not write much, comparatively speaking, yet the value of what he did write cannot be easily over-estimated. M. Renan may exaggerate when he affirms that F. "put in circulation the greatest number of ideas" of any contemporary writer; but even the Germans allow that in many points of literary history, criticism, and philology, F. was 20 years in advance of his age. After the July revolution, he was appointed a professor at the Sorbonne; in 1836, he published his chief work, *Histoire de la Gaule Méridionale sous la Domination des Conquérants Germains* (4 vols., Paris), which is reckoned one of the best specimens of historical investigation and art produced in modern times. Worthy of notice, also, particularly on account of its remarkable historical introduction, is his edition of the Provençal rhymed chronicle, entitled *Histoire de la Croisade contre les Hérétiques Albigeois* (Paris, 1837). F. also contributed several important essays to the literary journals of France, of which, perhaps, the best known was that on the origin of the Epic of Chivalry in the middle ages. He died at Paris, 15th July, 1844. Two years after his death appeared a collection of his professorial lectures, under the title of *Histoire de la Poésie Provençale* (3 vols., Paris, 1846), in which F. endeavors, with great erudition and originality of criticism, to show that to the Provençals must be attributed the composition and primitive development of the greater portion of the romances of chivalry, including those which describe the contests of the Christians and Moors in Spain, and those which form the Charlemagne cycle, thus finding the origin of the old Spanish and German poetry on the soil of France. F.'s views have, however, met with considerable opposition.

FAUSSE-BRAYE, in fortification, a low rampart encircling the body of a place, and raised about 3 ft. above the level ground. This work has been mostly discarded by modern engineers, except when used in front of curtains, under the name of *tenailles* (q.v.). The French engineers gave this title to the work, as an adaptation from the Italian term *fossa brea*, which had its origin from the fausse-braye being commonly in the ditch, in front of the main wall. The fausse-braye had the advantage of giving an additional tier of guns for defensive purposes; but the still greater disadvantage of affording facilities for the scaling of the parapet.

FAUSSE RIVIÈRE (in English, *False river*), is a lake of Louisiana, United States, which deserves notice chiefly as an index of the physical character of the country. Till about a century and a half ago, it was a channel of the Mississippi—a fact which is still probably expressed in its name. Here, as in other alluvial formations, the beds of the running waters are undergoing incessant changes.

FAUST, or **FUST**, JOHANN, the chief promoter of the invention of printing, a rich citizen of Mayence, d. in the year 1460. See GUTENBERG.

FAUST, DR., according to tradition, a celebrated dealer in the black art, frequently confounded with the preceding, was b. at Knittlingen, in Würtemberg, or, as some say, at Roda near Weimar. He flourished during the latter half of the 15th and the beginning of the 16th centuries, and is said to have studied magic at Cracow. After having spent a rich inheritance left him by his uncle, F. is alleged to have made use of his "power" to raise or conjure up the devil, with whom he entered into a contract for twenty-four years, obtaining during that time his fill of earthly pleasure, but at its termination surrendering body and soul into the hands of the great enemy. The devil gave him an attendant spirit or demon, called Mephistopheles, though other names are given him by the later traditionists, with whom he traveled about, enjoying life in all its forms, and astonishing persons by working wonders, till he was finally carried off by the evil one, who appeared in terrible guise, between twelve and one o'clock at night, at the village of Rimlich, near Wittenberg, though several other places lay claim to that very questionable honor. Some have doubted, considering the monstrously mythical form in which his career has come down to us, whether such an individual as F. ever existed; but it is now generally believed that there was a basis of fact, on which tradition has built its gross superstructure. Gorres, indeed, asserts that one George Sabellicus, who disappeared about the year 1517, is the real F.; but Philip Melanchthon —the man of all the reformers whose word in regard to a matter of fact would most readily be trusted—says that he had himself conversed with Dr. Faustus. Conrad Gesner (1561) is equally positive; and Luther, in his *Table Talk*, speaks of Dr. F. as a man lost beyond all hope. The opinion that prevails, and which is reckoned to be intrinsically the more probable, is that some man of this name, possessed of varied knowledge, may possibly have practiced jugglery (for the wandering savants of the middle ages had all a touch of the quack about them), and thus have been taken by the ignorant people for a dealer in the black art, and one who maintained a secret and intimate relation with evil spirits. His widely diffused celebrity not only occasioned the wonders worked by other so-called necromancers of an earlier age—Albertus Magnus, Simon Magus, and Paracelsus—to be attributed to him, but likewise many ancient tales and legends of a marvelous character were gradually transferred to him, till he finally appears as the very hero of magicians. But while, on the one hand, the narra-

tive of F.'s marvels afforded amusement to the people, on the other, they were made use of for instruction by the clergy, who pointed out, in the frightful fate of F., the danger of tampering with the "black art;" and the abominableness of a life sunk in sensuality and vice. The myth of F. has received a manifold literary treatment. First come the *Volksbücher* (or people's books), which record F.'s enterprises and feats. The oldest of these now known appeared at Frankfort in 1588. Then came an "improved" edition of the same, by Widmann, entitled *Wahrhaftige Historien von denen gräulichen Sünden Dr. Joh. F.'s* (true history of the horrible crimes of Dr. John F., Hamb. 3 vols., 1599); and in 1695, a work was published at Nürnberg by Pfitzer, based upon that of Widmann. The oldest of these books was translated into all the civilized languages of Europe. Impostors also published books of magic under the name of F., such as *Faust's grosser und gewaltiger Höllenzwang* (Faust's Great and Potent Book of Spells), *Fausten's Miraculkunst* (Faust's Art of Performing Miracles), and *Dreifache Höllenzwang* (The Threefold Book of Spells). These wretched productions are filled throughout with meaningless scrawls and figures, interspersed with texts from the Bible scandalously misapplied; but in the belief of the vulgar, they were supposed capable, when properly understood, of accomplishing prodigies. That the poetical art should in due time have seized on a subject affording so much material for the fancy to work upon, was inevitable; and consequently, German literature abounds in elegies, pantomimes, tragedies, and comedies on Faust. Since the end of the 17th c., the *Puppenspiel* (Puppet-show) of Dr. F. (first published at Leipsic in 1850) has been one of the most popular pieces in Germany. It forms the transition from the rude magic tales concerning F., to the later philosophic conception of the Faust-myth, which has become the most perfect poetical expression of the eternal strife between good and evil in the soul of man. The first writer who treated the story of F. dramatically was the English writer Christopher Marlowe, about the year 1600 (German translation by W. Müller, Berlin, 1818); but the grandest work on the subject is Goethe's *Faust*, the first part of which appeared under the title of *Dr. F. ein Trauerspiel* (Leip. 1790), and afterwards in a remodeled form, under the title of *F., eine Tragödie* (Tübingen, 1808). The second part was published after the author's death, at Stuttgart in 1833. Besides Goethe's drama, may be mentioned Eessing's masterly fragment, *F. und die Sieben Geister* (F. and the Seven Spirits), G. F. L. Müller's *Dr. F.'s Leben* (Dr. F.'s Life, Manh., 1778), and Klinger's *F.'s Leben, Thaten, und Höllenfahrt* (F.'s Life, Doings, and Descent Into Hell; Petersb. and Leip., 1791). The plastic art has also found a fit subject in Faust. In Auerbach's cellar at Leipsic, where F. is said to have performed many of his feats, are two rude daubs of the year 1525, representing F. and Mephistopheles riding out of the cellar on a wine-barrel. Rembrandt and Christoph von Sichem have also illustrated the story of F., and, in modern times, Cornelius and Retzsch have done the same. See Peter's *Die Literatur der Faustsage* (3d ed. 1857); Engel's *Das Volksschauspiel Dr. F.* (1873).

FAUSTI'NA, mother and daughter. The former, *Annia Galeria*, usually spoken of as *Faustina Senior*, was the wife of the Roman emperor Antoninus Pius, and died 141 A.D.; the latter, known as *Faustina Junior*, was married to his successor, Marcus Aurelius Antoninus, and died at a village near Mt. Taurus in 175 A.D. Both, but particularly the younger, were notorious for the profligacy of their lives, which their exemplary husbands in vain endeavored to check. After their deaths, institutions for the relief of poor girls were founded both by Antoninus and Marcus Aurelius in honor of them, and were called "*puellæ alimentariæ Faustinæ.*" Marcus Aurelius, in his Meditations, speaks highly of his wife, and an attempt has been made by Wieland to defend her against the imputations of the historians of the emperors.

FAUSTI'NUS I., Emperor of Hayti, known, before his elevation to the throne, as Faustinus Soulouque, a negro originally of very humble circumstances, was b. in St. Domingo in 1789. In his earlier years, he acted as servant, and afterwards as adjutant, to gen. Lamarre. He subsequently served under presidents Petion and Boyer, and by the latter was raised to the rank of capt. After the year 1844, when the Haytian republic—of which gen. Boyer was then president—was dissolved, a struggle for the supreme power ensued, in which F. played an important part. In 1847, he was appointed by the senate president of the republic. On the 16th April, 1848, a dreadful massacre of the mulattoes in Port-au-Prince took place at his instigation. This, and similar measures, struck terror into the hearts of his opponents. In Aug., 1849, he had himself proclaimed emperor of Hayti, a title which he enjoyed for about ten years; but a revolution having broken out in 1858, and a republic having been declared, F. was forced to abdicate, 15th Jan., 1859. He died 6th Aug., 1867.

FAUVEAU, FÉLICIE DE, b. Florence, 1803; a French sculptor of an old legitimist family in Brittany. She was compromised in the royalist movement of 1832, but escaped to Brussels. Among her works are "The Abbot" (from Scott's novel); "Judith showing the Head of Holophernes to the People;" the Dante monument, representing the death of Paolo Malatesta and Francesca da Rimini; and the tomb of a young Florentine girl.

FAUVELET, JEAN BAPTISTE, b. France, 1822; a painter, disciple of Meissonnier. Among his pictures are: "A Young Man Reading," "The Two Roses," "The Concert," "Nonchalance," "The Carver," "Two Musicians," and "The Prodigal Son."

FAUVETTE, a French name, partially adopted in the English language, for some of the little song-birds of the family *sylviadæ* or warblers, having straight slender bills slightly compressed in front, the ridge of the upper mandible curving a little towards the tip, and the legs not long. They mostly belong to the genus *curruca*, as the blackcap, the pettychaps or garden warbler, the whitethroat, etc.; and to the genus *salicaria*, as the sedge warbler, the reed warbler, etc. The Dartford warbler (*melizophilus provincialis*) is also called fauvette. They are all very lively little birds, continually flitting about in pursuit of insects, most frequently bushy places; and some of them, particularly those of the genus *salicaria*, preferring watery situations where reeds abound.

FAVA'RA, a t. of Sicily, in the s. of the island, in the province of Girgenti, and 4 m. s.e. of the town of that name. It has rich sulphur-mines. Pop. in 1871, 15,233.

FAVART, CHARLES SIMON, a French dramatist, was b. at Paris, 13th Nov., 1710, and first became known by his *La Chercheuse d'Esprit*, performed in 1741. In 1745, he married Mdlle. Duronceray, herself a dramatic writer of some note, and a singer of remarkable talent, and in the same year became director of the *Opéra Comique*. The fine taste and judgment of F. and his wife soon obtained for their theater a great reputation. It was they who made the first attempt to harmonize the costume of the actors and actresses with their impersonations, and to put a stop to the ridiculous practice of decking out soubrettes and country-girls in the attire of court ladies. So powerful, however, was the opposition excited against them by the jealousy of the other theaters, that the *Opéra Comique* was closed in the first year of its existence. After some time spent with maréchal de Saxe during his campaign in Flanders, F. and his wife returned to Paris, where the former continued to write operas. His wife died in 1772, and he 12th May, 1793. F.'s success as a writer was very great: he may be reckoned the father of the comic opera, and the happy successor of Le Sage, Piron, etc. The number of his pieces amounts to about 60, of which the most celebrated are *Comment l'Esprit vient aux Filles; Le Coq du Village; Bastien et Bastienne; Ninnette à la Cour; Les Trois Sultanes;* and *L'Anglais à Bordeaux*. His works have been published several times. An edition in 10 vols. was published at Paris in 1810, under the title of *Théâtre de Monsieur et Madame Favart*. A very interesting book, entitled *Les Mémoires et la Correspondance de Favart*, giving delightful glimpses of the literary and theatrical world of the 18th c., was published at Paris in 1809 by his grandson.

FAVERSHAM, a municipal borough and seaport in the n. of Kent, on a navigable creek, opposite Sheppey isle, 8 m. w.n.w. of Canterbury. It chiefly consists of four streets in an irregular cross. It has a valuable oyster-fishery, employing 200 to 300 persons. It sends much agricultural produce to London by hoys. The creek admits vessels of 150 tons. In the vicinity are some of the most important gunpowder factories in the kingdom. Pop. '71, 7,198. Under the name of Favresfield, it was a seat of the Saxon kings, where Athelstan, in 930, held a Witenagemôte. It has the remains of an abbey founded by king Stephen, where he and his queen, Matilda, are buried. St. Crispin is said to have been apprenticed to a shoemaker here. Near F. are some chalk caverns, with columns. In 1876, 8,861 vessels, of 399,837 tons, entered and cleared the port.

FAVIGNA'NA, the chief of the Ægades, a group of islands in the Mediterranean, off the w. coast of Sicily, lies at a distance of 6 m. from the Sicilian shore, and is about 6 m. long, with an average breadth of 2 miles. It has a town of the same name, with two castles, and a population of ('71) 4,642. F. is fruitful, has good pasturage, and produces excellent wine.

FAVONIA, a genus of jelly-fishes of the order *discophora*. One species has a hemispherical body, with a long proboscis and eight branch-like appendages.

FAVORI'NUS, a sophist of the time of Hadrian, a native of Arles, in Gaul, but for many years a traveler in the east. He was on intimate terms with Plutarch, Herodes Atticus, Demetrius of Alexandria, Aulus Gellius, and with the emperor Hadrian himself. He seems to have been caustic and satirical, but politic; for when he allowed the emperor to carry off the honors of an argument in which he might easily have won, he merely remarked that it was foolish to dispute with one who was master of thirty legions. Only a few fragments of his works have been preserved.

FAVORS, or MARRIAGE FAVORS, bows of white satin ribbons distributed at marriages in Great Britain, and usually pinned on the breast of all concerned, attendants and postilions included. The F. of those more immediately interested are sometimes enriched with orange-blossom. This is an old usage, connected with the love-knot of ancient northern nations; it forms almost the only remaining token of merriment in the nuptial ceremonial, and is, indeed, itself beginning to disappear.—See Brand's *Popular Antiquities*, edited by Ellis, article "Bride Favors."

FA'VOSITES, a genus of lamelliferous corals, found in Silurian, Devonian, and carboniferous strata. They were social corals, closely packed together, no space being left between the walls of the different corallites. As in the other paleozoic corals, the lamellæ are developed in multiples of four, and the older portion of the stony base is partitioned off by horizontal tabulæ.

FAVRE, JULES CLAUDE GABRIEL, a French advocate and minister, was b. at Lyons, 21st Mar., 1809. He is the son of a merchant, studied for the bar, and passed at Lyons in 1830. His political opinions have always been intensely republican, and when pleading in the course of numerous political lawsuits, F. not unfrequently placed the state solicitors, and even the judges, in a very embarrassing position by the boldness of his sentiments. As the defender of the *Mutuellists* at Lyons, in 1831, he was in danger of losing his life; this, however, did not prevent him from defending those who had been impeached in April, and commencing his speech with *Je suis républicain*. Since 1834, F. has been a member of the Paris bar. In the Feb. revolution of 1848, he was home secretary, in which capacity he wrote the notorious circular for which Ledru-Rollin's administration was so severely reproached, investing the commissioners of the republic with dictatorial authority in the provinces. He was active as a member of the committee of foreign affairs. After the election of the 10th Dec., F. showed himself a persistent antagonist of Louis Napoleon, and after the flight of Ledru-Rollin, became the orator of the mountain. The *coup d'état* closed his political career at this time. He refused to take the oath of fidelity to the imperial government, and betook himself again to his profession. In 1858, he defended Orsini on his trial for a conspiracy to murder. In the same year, however, he became a member of the legislature. In Sept., 1870, after the downfall of the empire, he was appointed minister of war, and carried on negotiations with count Bismarck. He resigned office in July, 1871, and resumed practice at the bar. F. is greatest in political repartee, and, though long accustomed to public strife, his language is noted for its Attic elegance.

FAVULA'RIA, a sub-genus of *sigillaria*, including some of the most remarkable trees of the coal flora. See SIGILLARIA.

FA'VUS (Lat. a honeycomb), a disease of the skin, chiefly of the hairy scalp, characterized by yellowish dry incrustations of more or less roundish form, and often cup-shaped, composed of the sporules and mycelia (q.v.) of a vegetable growth belonging to the order of fungi (q.v.). The disks of F. are produced with great rapidity, and spread rapidly, if not attended to at the first, over the whole scalp, destroying the bulbs of the hair, which becomes very short and thin, and then falls out altogether. F. is a disgusting and unsightly, but hardly a dangerous disorder; it is, beyond doubt, contagious, but only spreads where cleanliness is greatly neglected, and is therefore almost unknown among the better classes. It is far more common among children than among adults, and seems to be more frequent in Scotland than in England, and more frequent also on the continent than in either England or Scotland. The cure is sometimes attempted by a variety of medicated and simple ointments, and by pulling out the hair by the roots, or *epilation*, as it is called; but it seems hardly possible in inveterate cases to get rid of the disease without a very long persistence in habits of the most scrupulous cleanliness, and therefore the cure is seldom permanent, though easily attained for the time. F. is almost always followed by permanent baldness of the parts affected; unlike ringworm (q.v.), which is a minor disease of the same order.

The F. fungus, *achorion schœnleinii*, is nearly allied to the fungus which has recently proved so destructive to vines, and has by some botanists been placed in the same genus, *oidium*.

FAWCETT, HENRY, b. England, 1833; educated at Trinity hall, Cambridge, of which he was a scholar; graduated with high mathematical honors in 1856, and was elected a fellow in the same year. Mr. Fawcett was totally deprived of his sight in 1858 by an accident when shooting. Having written and published *A Manual of Political Economy;* the *Economical Position of the British Laborer;* and having been an extensive contributor of articles on economic and political science to various magazines and reviews, he was elected, in 1863, professor of political economy in the university of Cambridge. He unsuccessfully contested for a parliamentary seat, on liberal principles, Southwark in 1857; the borough of Cambridge in 1862; and Brighton in Feb., 1864; but he was returned for the last-named constituency in 1865, and was re-elected in 1868. He was unseated at Brighton at the general election of Feb., 1874, and was elected for Hackney in April of the same year. A new and revised edition of his *Manual of Political Economy* was published in 1869, with two new chapters on "National Education," and "The Poor Laws and their Influence on Pauperism;" and another edition with some additional chapters was published in 1874. He has since published *Pauperism—Its Causes and Remedies; Speeches on some Current Political Questions;* and *Free Trade and Protection.* Prof. F. married Millicent, daughter of Newson Garrett, of Aldeburgh, Suffolk, April 23, 1867. Mrs. Fawcett, who was born in 1847, published, in 1869, *Political Economy for Beginners;* in 1872, Mr. and Mrs. Fawcett published a joint volume of essays and lectures on political and economical subjects; in 1874, Mrs. Fawcett took an active part in advocating the extension of the parliamentary suffrage to those women who fulfill the qualifications of property and residence demanded of electors.

FAWKES, GUY (properly GUIDO), the head of the conspiracy known by the name of the gunpowder plot, was born of a Protestant family in Yorkshire, in the year 1570. He became a Roman Catholic at an early age, and served in the Spanish army in the Netherlands. Inspired with fanatical zeal for his new religion, on his return to England, he entered into a plot with several Catholic gentlemen for blowing up the king,

his ministers, and the members of both houses at the opening of parliament, 5th Nov., 1605. Guy F. was taken with the burning match in his hand, tried, and after having been put to the torture, was publicly executed Jan. 31, 1606. In remembrance of this event, in most English towns, but particularly in London, a grotesque figure, stuffed with straw, is carried about the streets on the 5th of Nov., and finally committed to the flames. A political and religious signification was again imparted to this custom by what was called "the papal aggression" in the year 1850, when the figure of cardinal Wiseman was substituted for that of Guy Fawkes.

FAY, ANDRÁS, a Hungarian author, was b. in 1786, at Kohany, in the county of Zemplén. After having studied philosophy and law at the Protestant college of Sáros-patak, F. was called to the bar. He held a situation for some time in the county of Pesth, which, however, he afterwards relinquished, in order to be able to devote himself altogether to literary pursuits. After two volumes of poetry, appeared the collection of fables (*Mesék*, Vien. 1820), and with the issue of that work F. obtained a decided reputation. The fables are like those of Phædrus and La Fontaine, but in prose. Richness of invention, simplicity of design, and truth of character, are the chief qualities for which the *Mesék* have become a household word among Hungarians. Among F.'s dramatic works may be mentioned the tragedy, *The Two Bathorys* (*A Két Báthory*, Pesth, 1827); the comedies, *Ancient Coins* (*Régi Penzek*), and *Hunters in the Matra* (*Mátrai Vadászok*). The novel, *The House of the Béltekys* (*A'Béltéky-haz*, Pesth, 1832), is rather of a didactic kind, but exhibits many features of Hungarian domestic life. Besides these, F. was a constant contributor to literary and scientific periodicals, and had also his share in some of those pamphlets by which great social questions, as, for instance, female education, savings banks, etc., were brought to a successful issue in Hungary. In reading F.'s works, we are frequently reminded of dean Swift. From 1825, which year may be said to have been the beginning of a new political life for Hungary, up to the year 1840, F. was foremost among the leaders of the liberal opposition in the county sittings of Pesth; but on the appearance of Kossuth, the strides of public life growing more and more rapid, F. gradually retired from the region of political controversy, turning his inventive mind to social improvements. The first savings bank of Hungary (at Pesth) was entirely F.'s work. His literary works were published in eight volumes at Pesth, in 1843–44. He was a directing member of the Hungarian academy of sciences. He died in 1864.

FAY, JONAS, 1737–1818; b. Mass.; a surgeon under Ethan Allen at the surrender of Ticonderoga; a member of the convention that declared Vermont an independent state; secretary of the state constitutional convention; one of the council of safety; member of the state council; judge of the supreme court; and agent of the state before congress, Jan., 1777; Oct., 1779; June, 1781; and Feb., 1782.

FAY, THEODORE SEDGWICK; b. N. Y., 1807; studied law, and was admitted to practice in 1828, but contributed to the *New York Mirror*, and subsequently became editor of that periodical. In 1832, he published *Dreams and Reveries of a Quiet Man*. After three years of European travel, he published his journal under the title, *The Minute Book*. In 1835, he published *Norman Leslie*, a novel, of which a second edition was issued the same year. From 1837 to 1853 he was U. S. secretary of legation at Berlin; and, 1853–60, resident minister at Berne, Switzerland. He has also published *Sidney Clifton; The Countess Ida; Hoboken; Robert Rueful; Ulric, or the Voices*, a poem; *Views of Christianity; Great Outlines of Geography; First Steps of Geography;* a *History of Switzerland;* and a series of papers on Shakespeare.

FAYAL, one of the most important of the Azores (q.v.), contains about 37 sq.m., and about 27,000 inhabitants. As one must infer from such density of population, the island is fertile. In its center is a mountain 3,000 ft. in height; and on its s.e. coast a convenient bay with good anchorage. Its principal town, Horta, stands on this bay in lat. 38° 30′ n., and long. 28° 41′ west.

FAYE'S COMET, discovered Nov. 22, 1843, in the constellation Orion; a bright nucleus with a short tail, but never sufficiently developed to be seen with the naked eye. Le Verrier showed that this comet came into our system as far back as 1747. It was rediscovered Nov. 28, 1850, by Chellis of Cambridge, and it came to perihelion Sept. 12, 1858. It was also seen in 1869. Its period is supposed to be nearly 7½ years, but it is too small to be of much interest. Its discoverer, Herve Auguste Etienne Albans Faye, a French astronomer, was born in, 1814. He became a member of the French institute, and was elected to the section of astronomy in 1841, and the bureau of longitudes in 1862. Two years later he entered the imperial council of public instruction, and was made an officer of the legion of honor. From 1848 to 1854, he was professor of geodesy in the *Ecole Polytechnique*, and in 1854 was chosen rector of the *Académie Universitaire* at Nancy. He has written valuable papers and text-books on astronomical science.

FAYETTE, a co. in n.w. Alabama; 684 sq.m.; pop. '70, 7,136—1077 colored. It is drained by the Sipsey and affluents of the Black Warrior rivers. Surface hilly and chiefly forest-land. Productions, cotton, corn, pork, etc. Co. seat, Fayette Court-house.

FAYETTE, a co. in w. Georgia, on Flint river; 240 sq.m.; pop. '70, 7,983—1121 colored. It has a varied surface, undulating or level, and is largely covered with timber. Cotton and corn are the chief productions. There are beds of iron ore and deposits of valuable granite. Co. seat, Fayetteville.

FAYETTE, a co. in s. central Illinois, on the Kaskaskia river, and the Illinois Central, and the St. Louis, Vandalia, and Terre Haute railroads; 786 sq.m.; pop. '70, 19,638. The surface is level, and much of it is covered with timber; soil fertile, producing corn, wheat, oats, hay, pork, etc. Coal and limestone are among the minerals. Co. seat, Vandalia.

FAYETTE, a co. in s.e. Indiana, on a branch of Whitewater river; traversed by the Whitewater canal, and the Cincinnati and Indianapolis Junction, and the Whitewater Valley railroads; 200 sq.m.; pop. '70, 10,476. Undulating surface and fertile soil, with considerable timber. The usual cereals are produced, and there is abundance of limestone. Co. seat, Connersville.

FAYETTE, a co. in n.e. Iowa, on the Burlington, Cedar Rapids, and Northern, and the Davenport and St. Paul railroads; drained by Turkey and Volga rivers; 720 sq.m.; pop. '75, 20,518. It has a prairie and forest surface, and produces wheat, corn, oats, hay, etc. Good limestone is found. Co. seat, West Union.

FAYETTE, a co. in n. central Kentucky, on the Kentucky river, intersected by the Cincinnati Southern, the Louisville, Cincinnati, and Lexington, and the Kentucky Central railroads; 320 sq.m.; pop. '70, 26,656—12,513 colored. The surface is varied, and offers some delightful scenery. The soil is very fertile, producing wheat, oats, corn, cattle, etc. Co. seat, Lexington.

FAYETTE, a co. in s.w. Ohio, crossed by the Dayton and Southwestern, and the Cincinnati and Muskingum Valley railroads; 414 sq.m.; pop. '70, 17,170. The surface is nearly level, and the soil deep and fertile, producing corn, wheat, cattle, pork, etc. Co. seat, Washington.

FAYETTE, a co. in s.w. Pennsylvania, on the border of West Virginia, intersected by the Youghiogheny river, and bounded by the Monongahela river; crossed by the Pittsburg, Washington, and Baltimore railroad; 800 sq.m.; pop. '70, 43,284. The surface is hilly, and largely covered with forests; soil fertile; chief productions, wheat, corn, oats, wool, pork, and butter. Co. seat, Uniontown.

FAYETTE, a co. in s.w. Tennessee, on the Mississippi border, crossed by the Nashville and Mississippi, and the Charlestown railroads; 676 sq.m.; pop. '70, 26,145—16,987 colored. Surface nearly level, with much forest-land. Products, wheat, corn, cotton, sweet potatoes, etc. Co. seat, Somerville.

FAYETTE, a co. in s.e. Texas, on the Colorado river, reached by the Galveston, Harrisburg, and San Antonio railroad; 1025 sq.m.; pop. '70, 16,863—5,901 colored. Surface undulating, and soil fertile; productions, cotton, corn, cattle, etc. Co. seat, La Grange.

FAYETTE, a co. in central West Virginia, bisected by the Kanawha river and the Chesapeake and Ohio railroad; 770 sq.m.; pop. '70, 6,647—118 colored. Surface rough, with fine mountain scenery; soil fertile, and adapted to cattle raising. Co. seat, Fayetteville.

FAYETTEVILLE is the name of a flourishing city of North Carolina, United States of America. Standing on the left bank of the Cape Fear river, about 140 m. from its mouth, F. marks the head of its natural navigation; while, by means of locks and dams, it communicates likewise with the upper basin of the river. While the interior sends down coal, the neighborhood is covered with forests of pine, which are traversed by 350 m. of plank-road, and yield tar and turpentine, of which latter there are several distilleries. Cotton and flour manufacture are largely carried on by water-power. The extensive arsenal of F. was seized by the confederates in 1861, and destroyed by Sherman in 1865. Pop. '70, 4,660, half of whom were colored.

FAYUM, the name of an Egyptian province, surrounded, in the form of a basin, by the Libyan desert, and connected merely by a narrow valley with that of the Nile, between lat. 29° to 30° n., and 30° to 31° east. This peculiar depression of the desert extends about 30 m. from n. to s., and about 40 m. from e. to w., its lowest point lying 100 ft. below the banks of the Nile at Benisuef. F. is one of the most fertile provinces in Egypt; producing, in addition to the ordinary useful plants of the country, roses, apricots, figs, vines, olives, etc., in great quantities. This fertility, in a province the soil of which is naturally arid and sandy, is the result of irrigation. A canal from the Nile was, at an early period, carried westward through a gorge in the Libyan hills, which here skirt the western bank of the Nile, and after dividing into numerous branches, lodged its waters in a depression in the n.w., thus forming, it is said, the lake Mœris (q.v.). The ancient capital of the province, called Krokodilopolis, and at a later period Arsinoë, stood on the eastern shore of lake Mœris, and upon its ruins stands Medinet-el-Fayûm, the chief town of the province, with a pop. of about 10,000 inhabitants.

FAZY, JEAN JAMES, 1796–1878; a Swiss statesman, educated in France, and connected with Parisian journalism. Returning to Switzerland in 1832, he was active in the

establishment of a new constitution, and of the introduction of trial by jury. In 1846, he was at the head of a provincial government of radicals in Geneva, and subsequently a conspicuous advocate of the new constitution. In 1853, he was vice-president of the federal council of states. He was again at the head of the Geneva government in 1855. In 1864, he was compelled to resign, and being indicted for complicity in the riots of that year, he fled to France, but subsequently returned, and occupied a seat in the grand council, which he resigned in 1865, but resumed again in 1868.

FEAL AND DIVOT is a predial servitude (q.v.) peculiar to the law of Scotland, in virtue of which the proprietor of the dominant tenement possesses the right of turning up and carrying off turf from the servient tenement for the purpose of building fences, roofing houses, and the like. This, as well as the servitude of fuel, implies the right of using the nearest grounds of the servient tenement on which to lay and dry the turf peats (q.v.) or feal. These servitudes do not extend beyond the ordinary uses of the actual occupants of the dominant tenements, and cannot be taken advantage of for such a purpose as to burn limestone for sale. They are not included in the servitude of pasturage, but must be constituted either by express grant, or by possession following on the usual clause of parts and pertinents. Ersk. ii. tit. ix. s. 17. The etymology of these words has been much disputed. *Feal* or *fail* is said to come from the Suio-Gothic *wall*, any grassy part of the surface of the ground; and Jamieson derives divot from *delve* (Sax. *delfan* or *delven*), or, as another alternative, says that it may have been formed by the monkish writers of old charters from *defodere*, to dig the earth. The former is the more probable conjecture.

FEALTY (Lat. *fidelitas*) is the fidelity which a man who holds lands of another owes to him, and contains an engagement to perform the services, or to pay the dues, for which the land is granted. It was embodied in an oath, by which the tenant bound himself on entering to the lands. In taking the oath of fidelity, Littleton says, s. 91, that the tenant shall not kneel, nor shall make such humble reverence as in homage. The only object of F. in modern times is to keep up the evidence of tenure where no other services are due; but even to this effect it has gone into desuetude.

FEAR, MANIA OF, or PANPHOBIA. There are many morbid manifestations of the instinct of cautiousness. Sudden fear in sleep, horrible dreams, nightmare, sleep-walking, have been regarded as symptoms of a special disease. Actual terror from irregular circulation in the sensory ganglia; the sense of falling or drowning in cardiac affections; incubus from disturbance of the circulation in the larger vessels by repletion, plethora, or position, where there is the superaddition of a delusion to the feeling of apprehension—are all allied and distinguished by involuntary and excited cautiousness. It is not only, however, when the intelligence may be supposed to be dormant, and the instincts awake, that such exaggerated fears paralyze minds otherwise sane and sound. Murat, "the bravest of the brave," and James I. of England, learned if not wise, were subject to vague, uncontrollable panics, which for a time unmanned them. The condition is often found associated with disease of the heart, as a consequence and concomitant rather than a cause. The presence of the *habitual* dread of evil, the fear of death, the sleepless and breathless anxiety during darkness, or solitude, or silence, as well as the sudden, wild, ungovernable panic, point to the existence of organic or functional diseases of the heart; and conversely, excited or irregular action of the organ, murmurs, angina, lead the astute psychologist to predicate fear as a characteristic of the mental condition. It precedes, and is believed to produce chorea, cancer, and scirrhus. Proximately, however, it depends upon alterations in the capillary circulation, or nervous structure of the brain. Its characteristic is involuntary, irresistible, blind terror, which arises and continues without an adequate cause, and which is not influenced by reason or religion, not even by the removal of the supposed object of alarm. The disease has appeared epidemically during commercial panics, during the horrors of cholera and plague, and in that singular affection called timoria, which is marked by debility, tremor, and terror, and has been traced to the effects of the damp, unhealthy regions in Sardinia and Sicily, where it exclusively occurs. Panphobia is hereditary, and has been traced through three successive generations. In reviewing the unobtrusive members of an asylum family, the pallid, startled, staring, flickering countenances may be detected as those of patients laboring under fear. They resemble melancholics in pallidity of skin, but in place of courting they shrink from sympathy; though horror-stricken by gloom, they hide in corners, they escape, they shriek in desperation, they climb trees, and apparently inaccessible places; and encounter real in order to elude fancied dangers; or they are motionless, paralyzed. They fear and flee from enemies, police, demons, death, punishment; indescribable agonies themselves.—Feuchtersleben, *Principles of Medical Psychology*, p. 281; Arnold, *Observations on Nature, Kinds, Causes, and Prevention of Insanity*, etc., vol. i. p. 257.

FEASTS. See FESTIVALS.

FEATHER, a river of California, and a feeder of the Sacramento, runs through one of the richest gold-fields in the state. It receives the Yuba near Marysville, which appears to mark the head of navigation—the distance down the F. and the Sacramento to the harbor of San Francisco being about 100 miles.

FEATHERFOIL, or WATER VIOLET, the *Hottonia inflata* of the United States, and *Hottonia palustris* of Europe, named from Peter Hotton, a Dutch botanist. It is a primulaceous plant, which grows submerged in water, but bears its blossoms, in the European species of great beauty, on long scapes sent up into the air.

FEATHER GRASS, *Stipa*, a genus of grasses remarkable for the long awns which give a peculiar and very graceful appearance to the species, mostly natives of warm temperate climates. In some of them, the awn is beautifully feathered. This is the case in the best known species, the COMMON F. G. (*S. pennata*), a very doubtful native of Britain, but found on dry hills in the middle and s. of Europe. It is a perennial, easy of cultivation, and a favorite ornament of our gardens. When gathered before the seeds are ripe, its feathery awns—sometimes a foot in length—remain attached, so that tufts of F. G. retain their beauty throughout winter, and form one of the most pleasing and familiar decorations of rooms. They are often dyed, to give variety to the decoration, but are never more beautiful than in their natural yellowish-white color. The feathery awns not only assist in the diffusion of the seed, which is carried by the wind to great distances, but in a very interesting manner help to fix it in the soil. The seed alights vertically, the furrowed base of the awn becomes twisted, so that its furrows form the threads of a screw, the feathery portion becomes horizontal, the wind acts on it, and the seed is screwed into the ground—a reverse action being prevented by stiff hairs which act as barbs.—The esparto (q.v.) of Spain is nearly allied to the common feather grass.

FEATHERS, a complicated modification of the tegumentary system forming the external covering or plumage of birds, and peculiar to this class of animals. Notwithstanding the varieties of size, strength, and color, all F. are composed of a quill or barrel; a shaft; and a vane, beard, or web, on either side of the shaft, the vane consisting of barbs and barbules.

The quill by which the feather is attached to the skin is wider but shorter than the shaft, and forms a semi-transparent, horny, cylindrical tube, which terminates below in an obtuse extremity, presenting an orifice termed the lower umbilicus. A second orifice, leading into the interior of the quill, and termed the upper umbilicus, is situated at the opposite end, where the two vanes meet and unite. The cavity of the quill contains a series of conical capsules fitted one upon another, and united by a central pedicle; and the whole structure presents a remarkable combination of strength and lightness.

The shaft is always of greater length than the quill, and tapers gradually to its free extremity; it is flattened at the sides, is more or less convex on the back, and presents a longitudinal groove inferiorly. It is composed of white, elastic, spongy structure, which is covered by a thin horny sheath.

At the point of junction of the shaft and quill, we usually observe—except on the F. of the wings and tail—a small supplementary shaft given off, which is furnished with barbs or fibers, and is termed the plumule or accessory plume. In the ostrich it is altogether absent; in the rhea, it is represented by a tuft of down; in the emu, on the other hand, it equals the original F. in size, so that the quill supports two shafts; and in the cassowary there is a second plumule of considerable size, so that the quill presents three distinct shafts.

The vanes or webs are composed of numerous barbs or small fibers arranged in a single series along each side of the shaft. They are fine prolongations of the outer coat of the shaft, are of a flattened form, and lie inclined towards the apex of the feather, with their flat sides toward each other, and their margins in the direction of the external and internal sides of the feather. The barbs are broader near the shaft than at the free apex, and in the large wing-feathers the convexity of one is received into the concavity of another. They are, however, generally kept in position by the barbules, which are minute curved filaments arising from the upper edge of the barb, much as the latter arises from the shaft. There are two sets of these barbules, one curved upwards, and the other downwards, and those of one barb hook so firmly into those of the next, as to form a close and compact surface. In the ostrich, the barbules are well developed, but are loose and separate, and it is this arrangement which gives to the F. of this bird their soft, plumous appearance.

F. present numerous gradations of structure. In the cassowary, the wings, instead of being provided with ordinary F., are furnished with five cylindrical stalks destitute of barbs, so that here we have merely the quill and shaft. On the breast of the wild turkey there is a tuft of F. resembling long black hair. In the *dasylophus cumingii*, the F. of the crest, breast, and throat are changed, at their extremities, into round, horny lamellæ, looking like shining black spangles; and in the common waxwing or Bohemian chatterer, some of the wing-feathers present at their extremities small horny expansions, resembling red sealing-wax, both in color and consistence.

Besides the common F., the skin of many birds, especially of aquatic species—in which plumules rarely exist—is covered with a thick coating of down, which may be described as consisting of very minute F., each of which is composed of a very small soft tube lying in the skin, from the interior of which arises a minute tuft of soft filaments, without any central shaft. This downy covering secures warmth without weight, like the soft fur at the base of the hair of arctic mammals. In most birds, the

skin also bears a good many scattered hair-like appendages, which indicate their relations to the ordinary F. by the presence of a few minute barbs towards the apex.

F. are developed in depressions of the skin, lined by an inversion of the epidermis which surrounds the bulb from which each feather springs; they grow, much in the same manner as hairs, by the addition of new cells from the bulb, which becomes modified into the horny and fibrous stem, and by the elongation of previously existing cells. They are, when first formed, living vascular parts, growing by nutrient vessels; but when they are fully formed, the vessels become atrophied, and the F. become dried up, and gradually die from the summit to the base. For a full account of the development of the different parts, we must refer to prof. Owen's article, "Aves," and to prof. Huxley's article, "Tegumentary Appendages," in the *Cyclopædia of Anatomy and Physiology*.

F. grow with great rapidity, and in some birds attain a length of more than 2 feet. They are almost always renewed annually, and in many species oftener; hence it may readily be conceived how much vital energy must be exhibited in their development, and how critical the period of molting must be. The plumage is generally changed several times before it attains the state which is regarded as characteristic of the adult bird; these changes may occupy a period usually ranging from one to five years.

Notwithstanding their extravascular nature, F., as is well known, undergo a change of color after they are completely formed. In yearling birds, the winter plumage, which succeeds the autumnal molt, gradually assumes brighter tints, the new color commencing at the part of the vane nearest the body, and gradually extending outwards till it pervades the whole feather. Dr. Weinland, an American naturalist, is of opinion, from a comparison of bleached specimens in museums, with recent ones taken from the bird, that the brightness and fading of the colors are due to the increase or diminution of an oily matter. Thus, the microscopic examination of the vane of F. from the breast of a fresh merganser showed numerous *lacunæ* containing a reddish oil-like fluid; some weeks after, the same F. having become nearly white from exposure to light, disclosed air-bubbles instead of the reddish fluid. If this fluid is an actual oil, as is most probably the case, it could make its way into the non-vascular tissue by mere physical imbibition; and on the varying quantities of this oil the variations of plumage would depend.

The property possessed by the plumage of most birds, of keeping the surface protected from moisture, is well known. This is due to two causes. Most birds are provided with an oil-gland at the base of the tail, whose secretion is distributed over the F. by means of the bill; and, additionally, the shedding of water is partly due to a thin plate of air entangled by the feathers.

The F. vary in form in different parts of the body, and afford zoological characters for the distinction of species. Hence, they have received distinct names, such as primaries, secondaries, tertiaries, etc., in ornithology. These terms are explained in the article BIRDS.

The chief uses to which F. are applied in the arts are three—*pens*, due to the peculiar elasticity of the barrels; *bed-feathers*, due to the combined softness and elasticity of the barbs; and *ornament*, due to the graceful forms and delicate tints of the whole feather. The mode of preparing the barrels for pens is described under QUILLS.

Bed-feathers were used in England in the time of Henry VII.; but it is not known how much earlier. At the present day, goose-feathers are preferred, the white rather than the gray. What are called *poultry* F., such as those of the turkey, duck, and fowl, are less esteemed, on account of their deficient elasticity. Wild-duck F. are soft and elastic, but contain an oil difficult to remove. The following is one among several modes of preparing F. for beds. Clean water is saturated with quicklime; the F. are put into a tub, the lime-water is added to the depth of a few inches; the F. are well steeped and stirred for three or four days; they are taken out, drained, washed in clean water, dried upon nets, shaken occasionally while drying, and finally beaten to expel any dust. The larger establishments, however, now prepare bed-feathers by steaming, which is found to be a more profitable and efficient process. The *down*, which is of so light and exquisite a texture as to have become the symbol of softness, is mostly taken from the breasts of birds, and forms a warm and delicate stuffing for beds, pillows, and coverlets. The most valuable is that obtained from the eider-duck, described under EIDER.

F. used for head-dresses, or other purposes of ornament, are selected according to the forms and colors which they display. The *ostrich*, a very valuable kind of feather, may be taken as an example of the way in which ornamental F. generally are prepared by the *plumassier*. The mode of catching the bird itself is noticed under OSTRICH; it suffices here to state that the hunters endeavor to avoid injuring the F. by blood or blows. When brought to England, the F. are assorted according to quality; those from the back and above the wings are the best, the wing-feathers next best, and the tail-feathers least valued. The F. of the male are rather more prized than those of the female. They are cleaned for use by repeated soakings and washings in water, sometimes with and sometimes without soap. There is also a process of bleaching by means of burning sulphur. When dried by being hung upon cords, the F. pass into the hands of the dresser, who opens the fibers by shaking, gives pliancy to the ribs by scraping them with bits of of glass, and curls the filaments by passing the edge of a blunt knife over them. If the F., whether of the ostrich or any other bird, remain in the natural



color, little more has to be done; but if a change of tint be required, the F. easily take dye-materials—such as safflower and lemon-juice for rose-color or pink, Brazil-wood for deed red, Brazil-wood and cudbear for crimson, indigo for blue, turmeric or weld for yellow, etc. A process of bleaching is adopted before the dyeing, except for black.

The kinds of F. chiefly used for ornament are those of the ostrich, adjutant, rhea or American ostrich, emu, osprey, egrett, heron, antrenga, bird of paradise, swan, turkey, peacock, argus pheasant, ibis, eagle, and grebe. White ostrich F. are prepared chiefly for ladies' head-dresses; and black for the Highland regiments and for funereal trappings. The white and gray marabout-stork F., imported from Calcutta, are beautifully soft and light, and are in request for head-dresses, muffs, and boas; the white kinds will sometimes sell for their weight in gold. The flossy kinds of rhea feather are used for military plumes, and the long brown wing F. for brooms and brushes. Osprey and egrett F. are mostly used for military plumes by hussar troopers. Bird of paradise F. are much sought after by oriental princes for turban-plumes. Cocks' F. are used for ladies' riding-hats and for military plumes. Dr. Macgown, who was United States consul at Ningpo a few years ago, has described, in the *American Journal of Science and Art*, an ingenious process which the Chinese adopt for combining brilliant-colored F. with bits of colored metal into garlands, chaplets, frontals, tiaras, and other ornamental articles.

FEATHER STAR, *Comatula rosacea*. An interesting member of the class of echinoderms, order of crinoids. It has a pentagonal disk or body composed of numerous polygonal plates from which spring ten slender, flexible, feathery arms, formed of numerous calcareous pieces placed end to end, but admitting of free motion. The arms are for locomotion and not prehension. The mouth is central and the alimentary canal is entirely contained in the disk or body, no part of it sending branches into the arms, as in asteroidæ. The feather star feeds upon minute organisms, which it draws into its stomach by the action of cilia in the alimentary canal. When young the animal is attached to a stalk, and has been mistaken and described as a distinct species under the name of *pentacrinus Europæus*. In attaining the adult state the animal becomes free. The genus *comatula* has a wide distribution, inhabiting most seas.

FEATHER-STONE, meaning, doubtless, *federal stone*, a stone table in the open air at which the ancient courts-baron were held, and where covenants were made.

FEB'IGER, CHRISTIAN, 1747-96; a revolutionary soldier, a native of Denmark. He was taken prisoner in Arnold's attack on Quebec, served honorably at Bunker Hill, Stony Point, and Yorktown, at the latter place commanding a Virginia regiment. In his later years he was treasurer of the state of Pennsylvania.

FEBRI'CULA (Lat. a little fever), sometimes called also ephemera (Gr. a fever of a day), a fever of short duration and mild character, having no distinct type or specific symptoms by which it can be distinguished and described. See FEVER.

FEB'RIFUGE (Lat. *febris*, a fever, and *fugo*, I drive away), a medicine calculated to remove or cut short fever (q.v.).

FEBRO'NIANISM, in Roman Catholic theology, a system of doctrine antagonistic to the admitted claims of the Roman pontiff, and asserting the independence of national churches, and the diocesan rights of individual bishops in matters of local discipline and church government. The name is derived from the *nom de guerre*, Justinus "Febronius," assumed by John Nicholas von Hontheim, coadjutor archbishop of Treves, in a work on these subjects, entitled *De Præsenti Statu Ecclesiæ*, which he published in the year 1767, and which, with its several successive volumes, led to a violent and protracted controversy, and elicited the severest censures of the Roman tribunals. See HONTHEIM, GALLICAN CHURCH.

FEB'RUARY, the second month of the year, has ordinarily 28 days, but in leap-year it has an additional or intercalary day. Among the Romans, it had originally 29 days in an ordinary year, but when the senate decreed that the eighth month should bear the name of Augustus, a day was taken from F., and given to August, which had then only 30, that it might not be inferior to July. The name is derived from the circumstance, that during this month occurred the Roman festival called the Lupercalia, and also Februalia, from *februare*, to purify.

FEB'RUUS (connected with Lat. *februare*, to purify) was the name of an old Italian divinity, whose worship was celebrated with lustrations during the month of Feb. The ceremonies instituted in his honor were believed to have the effect of producing fertility in man and beast. F., whose name in the Etruscan language is said to have signified god of the lower world, was also worshiped as such by the Romans, and identified with the Greek Pluto.

FECAMP, a manufacturing t. and seaport of France, in the department of Seine Inférieure, is situated in a narrow valley, flanked on either side by steep cliffs, at the mouth of a stream of the same name on the English channel, 23 m. n.e. of Havre. It consists mainly of one long street. Its principal building is the handsome church of Notre Dame, in the early pointed style, and dating from the 14th century. The harbor is frequented by colliers from Newcastle and Sunderland, and by Baltic timber-ships

and fishing-vessels. F. has cotton-mills, sugar-refineries, tanneries, ship-building yards, and some linen-cloth and hardware manufactures. Pop. '76, 12,074.

FECHNER, GUSTAV THEODOR, a German savant, b. 1801. After a course of study at Sorau and Dresden he studied medicine at Leipsic, where he became professor of physics. He has written largely upon chemistry, physics, anthropology, medical science, philosophy, and antiquities, besides poetry, criticism, and humorous literature. Among his more important works are *Nanna, oder über das Seelenleben der Pflanzen; Elemente der Psychophysik;* and *Physikalische und Philosophische Atomenlehre.*

FECHTER, CHARLES ALBERT, an actor of eminence, was b. in London about 1823, his father being a Frenchman. When only three or four years old, he went with his parents to France, and was there educated as a sculptor. His predilections were, however, in favor of the stage; and he soon became a popular actor. In 1860, he was announced to appear in an English version of *Ruy Blas* at the Princess's, and so perfectly identified himself with the character, that people almost forgot his French accent, in admiring the energy and finish of his acting. On the 20th of Mar. in the following year, he appeared in the character of "Hamlet." While abandoning the traditions of the English stage, F. showed himself capable of appreciating the difficulties he had to contend with, and in some measure of surmounting them. The impersonation was, upon the whole, one that marked F. as an actor of very high powers. The same may be said of his representation of "Othello." Subsequently F. became the lessee of the Lyceum theater, playing the chief part in most of the pieces produced. In 1870, F. paid a successful visit to the United States, where he thenceforward remained. There he died in Aug., 1879.

FECHTER, CHARLES ALBERT (*ante*), 1824–79; b. London. His father was of German and his mother of Italian descent. He was educated in France, and in 1840, appeared in private theatricals; in 1841, was with a strolling company playing at Florence, returning to Paris the same year and studying at the *conservatoire* with a view of entering the theater Française. For three years he studied sculpture, but gave it up for the stage, and in 1844 made his *début* in Paris as "Seyd" in Voltaire's *Mahomet.* Afterwards he played in Berlin, and in 1847 took a French company to London. From 1848 to 1860, he was the reigning favorite in Paris. He was the original "Armand Duval" in *Les Dames aux Camelias,* in which part he won remarkable success. In 1860, he made his first appearance in English drama in London in *Ruy Blas,* following with *Corsican Brothers, Don Cæsar de Bazan, Hamlet, Othello, Bel Demonio, Belphegor, Master of Ravenswood,* and as "Obenreizer" in *No Thoroughfare.* In 1870, he appeared in New York in most of these characters. He undertook to manage a theater in Boston, but did not succeed. In 1874, he appeared again in New York with Lizzy Price (who became his wife). Not long afterwards he retired to a farm in Pennsylvania, where he died.

FECKENHAM, or FECKNAM, JOHN DE, d. 1585; the last abbot of Westminster, and the last mitred abbot who sat in queen Elizabeth's parliament. He was chaplain to Bonner, bishop of London; and when the latter was deprived of his see, Feckenham was sent to the Tower. Although for much of the time a prisoner, he was active in political matters. Queen Mary released him and made him her chaplain. He was sent to lady Jane Gray, two days before her execution, to commune with her, and "to reduce her," says Foxe, "from the doctrine of Christ to queen Mary's religion." It is said that Elizabeth offered him the archbishopric of Canterbury; but that he refused it because he could not conform to the new (Protestant) faith. All his influence was thrown against the reformation and its doctrines.

FECULA, or FÆCULA, a term applied to starch obtained from various sources; in France, generally restricted to the starch of the potato. See STARCH.

FECUNDA'TION, or FERTILIZATION, in plants, takes place according to laws similar to those which prevail in the animal kingdom. In plants, however, the organs of reproduction are not permanent as in animals, but fall off—the male organs generally soon after fecundation, the female after the ripening of the seed. The male seminal substance, called *pollen,* never exists in a fluid state, but always in that of granules of various forms (*pollen grains*), which consist each of one cell, whose covering is of various thickness, and contains the impregnating substance. After the dehiscence of the anthers, the pollen gets into contact with the stigma of the pistil, which in its lowest and thickest part (the *ovary* or *germen*) contains the rudiments of the future seeds (*ovules*). The inner layer of the cell-covering of the pollen grain separates from the outer and thicker layer, as if it came out of a bag, and continuing to be elongated by growth, is carried down through the *style* to the germen, where it reaches the *foramen* or small opening of the embryo sac, and comes into contact with the ovule, or even in many cases penetrates into the ovule itself between its cells. By this time, one or other of the cells of the ovule has become considerably more enlarged than the other cells, and what is called the *amnion* has been formed, in the mucilaginous fluid of which (*protoblasma*), after the contact of the pollen-bag, through the dynamic operation of its contents, a *cell-germ* or *cytoblast* is soon developed. This cytoblast is the first commencement of a new and distinct cell, which divides into two cells. These

increase, by continually repeated separation of new cells, into a cellular body, which forms the more or less perfect *embryo* of a new plant. If the organ from which the pollen has proceeded, and the organ which contained the ovule, belong to the same plant or to plants of the same species, the embryo arising from this fecundation becomes a plant of the same species. But if the pollen by which the fecundation is affected comes from a plant of another species than that to which the plant belongs in whose germen the embryo is formed, the seed resulting from this fecundation will not, when it grows, produce plants of the same species, but *hybrids*, intermediate between the parent plants, and with various degrees of resemblance to one or other of them, but not perfectly corresponding with either. Hence the production of hybrids, and multiplication of varieties of plants in gardens, by what is called the artificial impregnation of the stigma of one plant with the pollen of another, which, however, must be of an allied species, hybridization being confined by the laws of nature within very narrow limits. See REPRODUCTION.

FECUNDATION (*ante*). One of the most interesting subjects of philosophical inquiry is that of insect fertilization of plants. Naturalists have long been aware of the fact that pistillate flowers, whether growing on the same trees with the staminate, or on different trees (monœcious or dicœcious), owe their fertilization to the agency of insects, which carry the pollen from the staminate to the pistillate flowers. Nearly all such plants have flowers which secrete a nectar attractive to insects, and this has been regarded as one of the numerous evidences of the agency of a designing providence; but still stronger evidence, if possible, is furnished by the fertilization of *perfect* flowers by insects. It has generally been thought that flowers bearing both stamens and pistils were always self-fertilizing, but this is not the case with many kinds. There is a provision by which several plants are prevented from in-and-in breeding, the parts of the flower being so arranged that it is impossible for the pollen to come in contact with the stigma. This is the case, among others, with the numerous family of *orchids;* and one of the most interesting works upon the subject was written by the advocate of the *Origin of Species by Natural Selection*, in which there is conclusive evidence that provision has been made, not only with the evident design of preventing self-fertilization, but also with the design of attracting the insect, which is made the agent of the fecundating act. (See *Fertilization of Orchids*, by Charles Darwin, London, 1862.) For the purpose of more perfectly insuring cross fertilization, in some flowers, the stamens precede the female organ in development, and shed their pollen before impregnation can take place, leaving the fertilization to be accomplished by the agency of insects, which carry the pollen from other flowers not so forward in development.

FEDERAL GOVERNMENT (Lat. *fœderatus*, bound by treaty, from *fœdus*, a treaty). When several states, otherwise independent, bind themselves together by a treaty, so as to present to the external world the aspect of a single state, without wholly renouncing their individual powers of internal self government, they are said to form a federation. The contracting parties are sovereign states acting through their representatives; and the extent to which the central overrules the local legislature is fixed by the terms of the contract. In so far as the local sovereignty is renounced, and the central power becomes sovereign within the limits of the federated states, the federation approaches to the character of a union; and the only renunciation of sovereignty which a federation as such necessarily implies, consists in abandoning the power which each separate state otherwise would possess of forming independent relations with foreign states. "There are," says Mr. Mill, "two different modes of organizing a federal union. The federal authorities may represent the governments solely, and their acts may be obligatory only on the governments as such, or they may have the power of enacting laws and issuing orders which are binding directly on individual citizens. The former is the plan of the German so-called confederation, and of the Swiss constitution previous to 1847. It was tried in America for a few years immediately following the war of independence. The other principle is that of the existing constitution of the United States, and has been adopted within the last dozen years by the Swiss confederacy. The federal congress of the American union is a substantive part of the government of every individual state. Within the limits of its attributions, it makes laws which are obeyed by every citizen individually, executes them through its own officers, and enforces them by its own tribunals. This is the only principle which has been found, or which is even likely to produce an effective federal government. A union between the governments only is a mere alliance, and subject to all the contingencies which render alliances precarious."—*Representative Government*, p. 301, 302. One of the chief difficulties which arise in organizing a F. G., consists in discovering by what means disagreements between one or more of the local governments and the central government as to the limits of their respective powers, are to be disposed of. The arrangement by which this object was sought to be effected in America, of which M. de Tocqueville expressed his admiration, is thus explained by Mr. Mill: "Under the more perfect mode of federation, where every citizen of each particular state owes obedience to two governments—that of his own state, and that of the federation—it is evidently necessary not only that the constitutional limits of the authority of each should be precisely and clearly defined, but that the power to decide between them in

any case of dispute should not reside in either of the governments, or in any functionary subject to it, but in an umpire independent of both. There must be a supreme court of justice, and a system of subordinate courts in every state of the union, before whom such questions shall be carried, and whose judgment on them, in the last stage of appeal, shall be final. Every state of the union, and the F. G. itself, as well as every functionary of each, must be liable to be sued in those courts for exceeding their powers, or for non-performance of their federal duties, and must in general be obliged to employ those courts as the instrument for enforcing their federal rights. This involves the remarkable consequence, actually realized in the United States, that a court of justice, the highest federal tribunal, is supreme over the various governments, both state and federal, having the right to declare that any new law made, or act done by them, exceeds the powers assigned to them by the federal constitution, and, in consequence, has no legal validity."—(P. 305.) "The tribunals which act as umpires between the federal and state governments naturally also decide all disputes between two states, or between a citizen of one state and the government of another. The usual remedies between nations, war and diplomacy, being precluded by the federal union, it is necessary that a judicial remedy should supply their place. The supreme court of the federation dispenses international law, and is the first great example of what is now one of the most prominent wants of civilized society, a real international tribunal. Mr. Mill's confidence in this remarkable tribunal, in which De Tocqueville shared, was disappointed. It proved unequal to the strain on the constitution caused by the political jealousies which in 1860 culminated in the great secession war. But, in ordinary circumstances, there is no reason to question its value in vindicating either federal or state rights.

FEDERAL GOVERNMENT (*ante*), a body-politic composed of the people of several different and in some respects independent states, over which, in its own prescribed sphere, it exerts a supreme authority; while outside of that sphere the states and the people thereof are sovereign within their respective jurisdictions. The character of a federal government varies with the extent of its powers. The first form of "federal government" established in this country was that of the "Articles of Confederation," adopted during the war of the revolution, July 9, 1778. The separate colonies, finding some form of central government indispensable to the efficient prosecution of the war of independence, gave a reluctant consent to those articles, which, while the war lasted, and all felt the presence of a common danger, worked tolerably, though not without some embarrassing friction arising from notions of colonial or state sovereignty. But after the independence of the country was established, and the pressure of a common danger no longer existed, there was a disposition to exalt the state, and to depreciate the national authority, which to some extent was regarded as a burden. The national government had no judicial tribunal to make an authoritative exposition of its powers, and no executive officers to enforce its decrees; it was entirely dependent upon the voluntary action of the states for means to carry on its operations; so that, in the language of Washington, it was "little more than a shadow without the substance," and "congress a nugatory body, their ordinances being little attended to." There was, in short, an utter want of all coercive authority on the part of the government to carry into effect its own constitutional measures. The embarrassments growing out of this state of things were endured till 1787, when a convention of delegates from the several states was held in Philadelphia "for the purpose of revising the articles of confederation and reporting to congress and the several legislatures such alterations and provisions therein as shall, when agreed to in congress and confirmed by the states, render the federal constitution adequate to the exigencies of the government and the preservation of the union." The convention encountered many difficulties arising from diversities of opinion among its members, and from conflicting local interests, but finally succeeded in framing a constitution which the people of the several states finally ratified, and which, with various amendments, has continued to this day. From the time of its adoption different theories of interpretation have prevailed, and these conflicting theories, to a greater or less extent, have determined the character and aims of political parties. It has been contended on the one side that the union was merely a league between the several states in their organized capacity, and that each state had the right, at its pleasure, of withdrawing therefrom. On the other side it has been held that the union, instead of being the creation of the states, as such, was formed by "the people of the United States," acting indeed through their respective state organizations, but still as citizens of a common nationality. According to this theory no right of secession on the part of a state has any existence, but it is the right and the duty of the national government to maintain the union by force. This question was brought to an issue in the late rebellion, the slaveholding states seeking to exercise the assumed right of secession for the protection of slavery, and the non-slaveholding states taking up arms for the defense of the union. The results of the war are generally regarded as a vindication of the anti-secession theory, though there are still some disputed questions as to the relative powers of the national and state governments.

Another example of federal government is afforded in the Dominion of Canada, founded in 1867 by a union of the provinces of Canada West, Canada East, New

Brunswick, and Nova Scotia, and afterwards enlarged by the addition of the provinces of Manitoba and British Columbia, the British territory, and Prince Edward island. These provinces have each its local legislature, while the government of the Dominion, essentially like that of the American union, extends over the whole territory. The government of the Dominion is administered by a governor-general appointed by and representing the British crown and exercising his authority with the aid of a council appointed by himself. The parliament consists of a senate of not more than 72 members, appointed for life by the governor-general; and a house of commons of 180 members, chosen by and representing the people of the several provinces. The different cantons of Switzerland are united under a common government in a similar way.

FEDERALIST, THE, a collection of essays in favor of the new constitution of the United States, with the exception of the concluding nine of the eighty-six numbers, originally published in *The Independent Journal*, a semi-weekly newspaper printed in New York, between the 27th of Oct., 1787, and the 2d of April, 1788. The authors were Alexander Hamilton, James Madison, and John Jay, who addressed themselves over the common signature of "Publius" in a series of letters "To the People of the State of New York," with the avowed purpose of securing the accession of that state to the constitution as proposed by the federal convention of Sept. 17, 1787. The essays have often been republished in a volume.

FEDERALISTS, the earliest political party organized in the United States after the achievement of liberty. The leaders were Washington, Adams, Hamilton, Jay, Marshall, and others of their rank and ability. In the French revolution, the federalists sympathized rather with England than with the party of Marat and Robespierre; and this gave occasion to Jefferson, who was ambitious to be president, to organize, in connection with Burr and others, a party called "republican," whose distinctive features were to intensify the natural feeling against England, and to accuse the federalists of being enemies of the masses of the people, of favoring an aristocratic government, and even of designs against the newly achieved liberties of the nation. The federalists had their own way in the elections for the first three terms, electing Washington twice and John Adams once; but in the canvass of 1796, Jefferson and Burr were the republican candidates. At that time, no discrimination was made by the electoral college between president and vice-president; each elector voted for two persons, the man having the highest vote took the first office, and the other went to the next highest. The vote was: Adams, 71; Jefferson, 68; Pinckney (fed.), 59; Burr (rep.), 30; with 46 votes scattered among nine others. Thus, we had a federalist for the first and a republican for the second officer. In 1800, Adams was again a candidate, with C. C. Pinckney (fed.), and Jefferson and Burr (rep.) opposed. The electoral vote showed for Jefferson, 73; Burr, 73; Adams, 65; Pinckney, 64. There being an equal vote between Jefferson and Burr, the house of representatives was compelled to elect, and the vote was taken by states. After 36 ballots, Jefferson got 10, and Burr 4 states, and two states voted blank. So Jefferson took the first office. In subsequent elections, the federalist candidates for president were Charles C. Pinckney in 1804 and 1808, De Witt Clinton in 1812, and Rufus King in 1816. Clinton had the largest electoral vote, 89 to 128 for Madison. In the struggle with England, the federalists were charged with hostility to the war; and with some show of reason. The capitalists and merchants of the country were chiefly of that party, and capital always dreads the disturbance of war. Although weak in votes they were strong in social and political position and influence, and were a constant source of fear to the more popular republicans. In 1814, the federalists committed suicide as a party by holding the famous Hartford convention, the motives and actions of which were construed, though unjustly, yet not unnaturally, to be directly opposed to the war, and little short of treasonable. In fact, the convention was opposed not to the war, but to the manner in which it was conducted, and to acts of the administration which they deemed oppressive and unjust to the New England states. See HARTFORD CONVENTION. The unmeasured denunciation of this convention overwhelmed what there was left of the old federal party, and it speedily passed out of consideration as a national organization. In the succeeding presidential election (1816), Rufus King got but 34 out of 221 electoral votes, and only three (Massachusetts, Connecticut, and Delaware) of the 19 states. The last appearance of a federalist candidate for president was in 1820, when their leader, John Quincy Adams, received one electoral vote (from New Hampshire) out of a total of 235.

FEDERAL THEOLOGY is the result of efforts to compress the doctrines of Christianity within the bounds of certain covenants conceived of as made between God and men. The essential idea of an ordinary covenant—that of a mutual compact between two parties by which each engages to render some benefit to the other—is indeed shut out by the nature of the case. When God and men are the parties, the benefit distinctively comes from him and the obligation distinctively rests on them. If the relationship exist between them, it must be determined and imposed by his sovereign right as a ruler. Yet it is more than a law or a promise. It includes a law to be obeyed, but the benefits far transcend the merit of the obedience. Mutual consent and obligation also are, in some sense, implied, as, on the one hand, God graciously binds himself to fulfill certain promises, and, on the other, men consent to the arrangement when, understanding the conditions prescribed, they enter on a course of obedience. Those who find advantage in

adopting this method of expressing Scripture truth, generally speak of two covenants, the one of works, the other of grace. In both they see the same contracting parties—God and man; the same blessing to be secured—eternal life; and the same requirement of perfect obedience: but in the covenant of grace there is a dispensation of mercy, through the divine Mediator, which secures eternal life. I. The covenant of works, though nowhere in Scripture spoken of under that name, is thought to be referred to or implied. Some, indeed, think that it is expressly mentioned in Hosea vi. 7, which they translate, "They, like *Adam*, have transgressed the covenant." The contrast and analogy which Paul traces between the first and second Adam would (they say) have no basis unless a covenant had been entered into with the one as well as the other. Several essential features of a covenant are (they think) to be seen in the constitution under which Adam was placed: 1. Eternal life was promised him on condition of his obedience; 2. He was constituted the representative of his race; 3. His powers were sufficient for the performance of the condition; 4. He would have secured eternal life for his descendants, as well as for himself, had he continued faithful; 5. The penalty of disobedience was death, natural, spiritual, and eternal, as each of these followed a forfeiture of a divine life. After a time (how long is not known) this covenant was broken on the part of man who, "being left to the freedom of his own will, fell from the estate in which he was created." II. The covenant of grace is the name given, according to the view of these theologians, to God's glorious appointment of salvation by grace. We may conceive of the race as fallen, and of a merciful provision being made by which a door is opened wide enough for all mankind to enter, with a system of means by which the actual salvation of a limited number will be secured. Or we may regard the eye of God as fixed first on a limited number of the fallen race, and for their sake alone providing an atonement, sufficient indeed for all men, but designed and efficient for the salvation only of that limited number. The latter is the aspect in which the covenant of grace is presented by some at least of its advocates. They suppose that God from eternity, anticipating the temporary character of the covenant of works, ordained another plan by which a portion of mankind would be saved from the ruins of the fall. Why he did not include the whole or a larger portion of mankind within the scope of his saving grace they prefer to leave where, they think, revelation leaves it—to the mere good pleasure of God. And, as the Bible speaks of some who were chosen in Christ before the foundation of the world, they infer that there must have been in eternity an agreement between the persons of the sacred Trinity, according to which a seed was given to the Son to serve him. Without ascribing to the transaction the technicalities of a human compact, they contend that something equivalent to it must have existed. And as men could not act for themselves, the Son of God acted for all those of whom he was to be the spiritual head. To constitute a natural ground for this headship, he was to become Man, uniting his divinity in one person with humanity. He would thus become the federal head of his spiritual seed (as Adam was of his natural descendants), and as such, acting as their representative, the Son would share with them the curse which the first sin brought on the human race, suffering even unto death in its most terrific form. Though these sufferings would not be the same as the doom which otherwise would have come on them spiritually and eternally, they are supposed to be of infinite value on account of his infinite dignity. They are indeed sufficient in objective worth to make expiation for any amount of sin in any number of worlds. They do actually confer innumerable benefits on all men. Through them pardon and salvation are offered to every one who hears the gospel: time, opportunity, and means of grace are afforded to all. But, it is agreed, all are not made partakers of salvation, and only a portion of mankind were eternally given to Christ. Plainly the success of his work was not left uncertain. A seed was secured to him by covenant; and it was with ultimate and supreme reference to these that he entered on his work. Such, it is declared, was the covenant of grace as formed in eternity. To this is to be added its accomplishment in time. The administrator of it is the Son of God himself, the mediator between God and man. He has power over all flesh, that he may give eternal life to as many as have been given him. He represented the divine ruler in all the merciful dispensations of which sacred history informs us. Although at different periods the outward forms of religion have been changed, the covenant of grace, which is the foundation of all, has always been the same. Believers before the flood, the patriarchs, Job and his friends, the Israelites under the Mosaic dispensation, looked for forgiveness under certain prescribed conditions, and for a city beyond the present world, whose builder and maker is God. All national restriction removed, and the Holy Ghost in his fullness given, the Christian dispensation is the ultimate form in which the covenant of grace will be administered. The Lord Jesus Christ will continue to be its head until the whole world is subdued unto him. Finally, the present economy of things will cease, the dead will be raised, the living changed, all men judged at Christ's bar, and sentence passed on them according to their works. Then having obtained full possession of his kingdom, the Son will deliver it to the Father, either as indicating the close of his mediatorial office, or perhaps only in token of the completeness and loyalty of his work. It may be noted here that there is a form of theology which, recognizing the great facts of salvation by God's eternal grace, and not denying that they may be made

to appear under terms of various covenants, deems it more natural and scriptural to set them forth under the terms of sovereign divine constitutions or ordainments.

FEE, ESTATE IN, the largest estate in land in point of quantity of estate known to the law of England, being a freehold (q.v.) of inheritance. Estates in fee are divided into fee-simple and fee-tail. A fee-simple is defined by Littleton (1, a.) to be a lawful and pure inheritance. In order to create an estate in fee-simple by deed, it is necessary that the word heirs should be used; for a gift by deed to a man forever, or to a man and his assigns forever, creates only an estate for life. But words of perpetuity annexed to a gift to a man by will are construed as carrying an estate in fee. The proprietor of an estate in fee-simple enjoys the fullest rights of property over his estate, which he may alienate or burden at pleasure, and out of which he may grant estates of a lower kind, as for life or years. He is owner of the soil "*a cœlo usque ad centrum,*" and is therefore entitled to every product of the land, as timber, etc., and to all minerals and other valuable productions found beneath the surface. On his death, the estate descends to his right heirs, except in the case of fees held by corporations, which descend to their successors in office. Where a man claims an estate in fee-simple in possession in a corporeal hereditament (q.v.), he is said to be "seized in his demesne as of fee." Estates in fee-simple are divided into fee-simple absolute, qualified or base, and conditional. A qualified or base fee differs from a fee-simple absolute by having a qualification annexed which may determine the estate, as where it is granted to a man and his heirs "tenants of the manor of Dale." If, therefore, at any time the holder of the estate ceases to be the tenant of Dale, the estate, which depended on that qualification, determines.

A *conditional fee* was limited to a particular class of heirs, to the exclusion of others, as to a man and the heirs-male of his body. On failure of heirs-male of the body of the grantee, an estate of this kind reverted to the grantor or his heirs. But although the estate was thus limited, by the terms of the deed, to a particular series of heirs, the judges previous to the reign of Edward I. held that the gift was a fee-simple on condition of the birth of heirs of the body of the grantee, and that on the birth of an heir of the body, the condition on which the estate was held was purified. The estate did not indeed become *ipso facto* a fee-simple absolute, but the grantee was held entitled to sell the estate, to forfeit it for treason, and to burden it with incumbrances. But if the estate was not sold, and descended to the heir, he continued to hold a fee-simple conditional. This state of things led to the famous statute *De Donis Conditionalibus* (13 Ed. I. c. 1), whereby it was enacted that estates should be held *secundum formam doni.* Estates created by this statute were called estates in *fee-tail.* See ENTAIL.

The original mode of transferring an estate in fee was by feoffment (q.v.), but the statute of frauds (29 Char. II. c. 3) requiring that writing should be used in all transfers of land, estates in fee must now be conveyed by deed or will.

The proprietor of an estate in fee-simple in the present day is substantially absolute owner of the freehold, which he holds without owing duty or service to any one, except the allegiance due to the sovereign, who is regarded as supreme lord of all the lands in the kingdom. But originally this was not so; an estate in fee is in its nature a feudal benefice, a feud, and the owner of the fee held his estate subject to all the services incident to the feudal state. But these duties have been by degrees entirely abolished in England. See FEUDAL SYSTEM, TENURES. In Scotland, the feudal usages in regard to land are still retained to a very great extent. See Paterson's *Compendium of English and Scotch Law.* An estate in fee in Scotland must be held by one of the three existing tenures, viz., feu, blanch, or burgage, and is subject to the casualties (q.v.) attaching to these rights.

FEE-FUND, in Scotland, is the fund arising from the payment of dues of court on the tabling of summonses, the extracting of decrees, and the like. Out of this fund, the clerks and other inferior officers of the court were paid. If the fund was at any time insufficient for the purposes to which it was applied, the deficiency was supplied out of the moneys provided by the acts 7 and 10 Anne for keeping up the Scottish courts of law. The offices of collector and accountant of the fee-fund were abolished in 1868, and the duty is now collected by stamps.

FEEJEE. See FIJI.

FEE AND LIFE-RENT (in the law of Scotland)—the first of which is the full right of proprietorship, the second the limited right of usufruct during life—may be held together, or may co-exist in different persons at the same time. The settling of the limits of the rights which in the latter case they respectively confer, is of very great practical importance, and, from the loose way in which both expressions have been used by conveyancers, by no means free from difficulty. "In common language," says Mr. Bell, "they are quite distinct; life-rent importing a life-interest merely, fee a full right of property in reversion after a life-rent. But the proper meaning of the word life-rent has sometimes been confounded by a combination with the word fee, so as in some degree to lose its appropriate sense, and occasionally to import a fee. This seems to have begun chiefly in destinations 'to husband and wife, in conjunct fee and life-rent and children in fee;' where the true meaning is, that each spouse has a joint life-rent while both live, but each has a possible fee, as it is uncertain which is to survive. The same

confusion of terms came to be extended to the case of a destination to parent and child —'to A. B. in life-rent, and the heirs of the marriage in fee'—where the word life-rent was held to confer a fee on the parent. It came gradually to be held as the technical meaning of the word 'life-rent to a parent, with fee to his children nascituri,' that the word life-rent meant a fee in the father. Finally, the expression came to be held as strictly limited to its proper meaning by the accompanying word 'allenarly,' or some similar expression of restriction; or where the fee was given to children nati and nominatim; there being in that case no necessity to divert the word life-rent from its proper meaning, or, on a similar principle, where the settlement was by means of a trust created to take up the fee." (*Prin.* s. 1712.)

FEELING. See EMOTION.

FEES. Neither barristers nor physicians could recover their fees by legal proceedings against their clients or patients, except under a special contract. The ground of this rule was that they are regarded not as payment, but as an expression of gratitude for services the value of which cannot be appreciated in money. The origin of the rule in the case of the advocates, is traced to the relation which subsisted between patrons and their clients in ancient Rome. When the former appeared as the defenders of the latter, they practiced, as Blackstone says (iii. 29, Kerr's ed.), *gratis*, for honor merely, or at the most for the sake of gaining influence; and so likewise, it is established with us that a counsel can maintain no action for his fees, which are given, not as *locatio vel conductio*, but as *quiddam honorarium;* not as a salary or hire, but as a mere gratuity, which a counselor cannot demand without doing wrong to his reputation. The rule at Rome was maintained even under the emperors, and Tacitus mentions (*Ann.* lib. ii. c. 5) that it was directed by a decree of the senate that these *honoraria* should not in any case exceed 10,000 sesterces, or about £80 of English money. It has further been decided in England, that no action lies to recover back a fee given to a barrister to argue a cause which he did not attend (Peake, 122). But special pleaders, equity draftsmen, and conveyancers, who have taken out certificates to practice under the bar, and therefore are not counsel, may recover their reasonable charges for business done by them (Poucher *v.* Norman, 3 B. and C., 744). Another rule with reference to the fees of barristers and advocates is, that they are paid before they are earned; a rule which, by removing from its members all pecuniary interest in the issue of suits, has done much to maintain the independence and respectability of the bar. As regards physicians, the rule that a fee could not be recovered by an action at law, was applied in the case of Chorley *v.* Bolcot, June 30, 1791 (4 T. R. 317). If, however, either a barrister or a physician acted under a special agreement or promise of a certain payment, then an action might be brought for the money. But all medical practitioners were relieved from the above code of honor by the act of 21 and 22 Vict. 90, which applied to the United Kingdom, and enabled them to recover in any court of law their reasonable charges as well as costs of medicines and medical appliances used. This rule applies to physicians, surgeons, and apothecaries as defined by the statute. Members of the inferior branches of both professions—attorneys, solicitors, etc., on the one hand, and surgeons, dentists, cuppers, and the like on the other—were always entitled to raise action for their fees. In Scotland, the same rules prevail as in England with reference to both professions. In France, though the delicate sense of honor of the bar has always been preserved with quite as much care as in England, the rule is somewhat different. In law, an action for the recovery of fees would be maintainable in that country by an advocate; but "in Paris, the rule of the ancient bar, founded on the disinterestedness which was its characteristic, and according to which any judicial demand of payment of fees was strictly forbidden under pain of erasure from the table (of advocates), has been religiously preserved." *History of the French Bar*, by Robert Jones, 1855. The practice in France, however, seems to be for the fees of advocates to be paid afterwards, though any bargain with the client or his agent that their amount shall depend on the issue of a trial, is regarded as dishonorable, and on several occasions the bar has vehemently resisted regulations calling on them to acknowledge receipt of their fees, as wounding their sensibility. There can scarcely be a stronger proof of the value of what seem in themselves to be trifling and pedantic pieces of etiquette, than the dignified and independent position, which, from its scrupulous sense of honor, the French bar has maintained during all the political revolutions which the country has undergone.

FEHÉRVÁR (SZÉKES), the same as the Latin *Alba Regia*, or the German *Stuhlweissenburg*, is one of the most ancient royal free towns of Hungary, situated in a marshy district about 40 m. s.w. of Pesth. Under the Arpádian kings, it was the metropolis of the realm, and the residence of the sovereigns, who have been often crowned and buried there. On many occasions, the diets also were held in F., where twelve kings—among which are St. Stephen, and the great Mathias Corvinus—lie buried. It is the seat of a bishop, and contains a pop. of (1869) 22,683, chiefly Roman Catholics, and all of the Magyar race. Water is supplied by an artesian well.

FEHMIC COURTS, or VEHMGERICHTE. See FEHMGERICHTE, *ante*.

FĔÏ'A, a large lake of Brazil, lies on the maritime border of the province of Rio Janeiro, and is distant 150 m., to the n.e., from the city of the same name. It is so near to the Atlantic that it has been connected with it by means of a canal. F. is about a degree to the n. of the southern tropic.

FEIGNING OF DISEASE is much practiced in the army and navy, and also by convicts and others anxious to escape from discipline, or procure a discharge from compulsory service. In the army, it is technically called *malingering*. The detection of feigned disease, of course, necessarily belongs to the highly educated physician, and is impossible without a thorough knowledge of the reality, unless, indeed, the imitation be very coarse and badly studied. The diseases most commonly simulated are epilepsy, catalepsy, convulsions, blindness, deafness, palsy, insanity, indigestion, neuralgia, rheumatism, palpitation of the heart, and generally all disorders which may exist without leading to any distinct external appearances. Ulcers of the legs, however, have often been made, and kept open artificially through the application of irritant substances; and vomiting or coughing up of blood is very easily simulated, if the supposed patient can get access to the necessary materials in the slaughter-house or elsewhere. The detection of such impostures is easy or not according to the opportunities and knowledge and skill of the deceiver, as compared with those brought to bear on the discovery of the fraud. Many men in the public services, and women affected with hysteria, have become so expert as to deceive even men of high character and skill. The writer has known of an instance in which a man submitted to successive amputations of the arm upwards nearly to the shoulder, for an ulcer produced and kept open at will by local applications; and a case was some time ago recorded by Dr. Murchison in the *Medico-chirurgical Transactions*, in which there is no reasonable doubt that a large opening into the stomach was the result of caustic substances deliberately applied to the abdomen, with the view of exciting sympathy.

FEINT (from the Fr. *feindre*), in military or naval matters, a mock attack or assault, usually made to throw an enemy off his guard against some real design upon his position. See FENCING.

FEITH, RHIJNVIS, a distinguished Dutch poet, who ranks next to Bilderdijk (q.v.) as a reviver of the national poetry, was b. 7th Feb., 1753, at Zwoll in Overyssel, studied law at Leyden, and returned to his native town in 1776, where he held the office of burgomaster. He died 8th Feb., 1824. F. tried almost all kinds of poetry. In his earlier productions, he showed an excessive inclination for the sentimental; but in 1792 appeared his *Het Graf* (The Tomb), a didactic poem, which, though not free from the weakness referred to, is yet on the whole happily conceived, and contains some admirable passages. His *De Ouderdom* (Old Age), published in 1802, is deficient in plan. Among his lyrical pieces, *Oden en Gedichten* (Odes and Miscellaneous Poems, 4 vols., Amst. 1796–1810), are several marked by a high enthusiasm and warmth of feeling. Of his tragedies, the best known are *Thirza* (1791); *Johanna Gray* (1791); and *Ines de Castro* (1793). Along with Bilderdijk, he recast in a nobler form Haren's famous patriotic poem, *De Geuzen* (Les Gueux, or the Beggars), which celebrates the first struggles of the Dutch for independence. Of F.'s prose works, the most important are *Brieven over verscheiden Onderwerpen* (Letters on Different Subjects, 6 vols., Amst. 1784–90). These letters, by their polished style and refined criticism, did much to improve the literary taste of Holland.

FEKE, ROBERT, one of the earliest of American artists, his portraits dating back to about 1746. He settled in Newport, R. I., but visited Philadelphia, New York, and other cities professionally. It is said that when young he was made a captive and taken to Spain, where he employed himself in making sketches, from the proceeds of which he was enabled to return home.

FELANITCHE', or FELANITZ (anc. *Canatix*), a t. of the island of Majorca, 27 m. e.s.e. from Palma. It is situated in a valley, surrounded by mountains, and is well built, with a number of squares and wide streets. It has a convent and a hospital. On a neighboring hill is an ancient Moorish castle, with subterranean vaults. Linen and woolen fabrics are manufactured; rope-making and brandy-distilling are also carried on. There is some trade in the products of the neighboring country—rice, coffee, sugar, wine, brandy, fruit, and cattle. Pop. 8,102.

FELDKIRCH, the chief t. in the Voralberg district, Tyrolean Austria, at the junction of the valleys of the Rhine and the Ill, 6½ m. above the confluence of the two rivers; pop. '69, 2,868. It is a place of considerable trade, and has manufactures of cotton, metals, etc. It is the seat of a bishop, and has a Jesuit seminary and a Capuchin monastery. Near the place are the ruins of the castle of Schattenburg, where the counts of Montfort had their seat.

FELDMANN, LEOPOLD, a German writer of comedies, was b. at Munich in 1802, of Jewish parents, to whose faith he remains attached. Apprenticed in 1815 to a saddler, and afterwards to a cobbler, he soon gave evidence of his determination to be a poet by sending, in a pair of shoes, which he had mended, a poetical expression of his devotion to their fair wearer. For this his master sent him back to school, where in 1817, when only 15 years old, he wrote a play, *Der Falsche Eid* (The False Oath), which was actually

produced on the stage. After spending a few years in business at Pappenheim, and subsequently in Munich, he was induced, by the reputation which he gained from some humorous pieces, entitled *Genrebilder*, to devote himself entirely to literature. In 1835, his *Höllen-lieder* (Hell-Songs) appeared; and his first comedy, *Der Sohn auf Reisen* (The Son on his Travels), was acted in Munich with applause. While traveling thereafter for five years, chiefly in Greece, he wrote "Pictures of Travel" for Lewald's *Europa*, and the correspondence for the *Allgemeine Zeitung*. In 1841, his comedy was produced in Vienna, and since 1850, he has been employed as histrionic teacher in the national theater of that capital. F.'s works, which are numerous, are reckoned among the best specimens of modern German comedy, pleasing by their cheerful humor, and happy employment of contemporary ideas and events, though complained of as deficient in artistic finish. F. has published a collection of his comedies *Deutsche Originallustspiele* (Original German Comedies), 1844–52; new series, 1855–57.

FELDSPAR (Ger. *feldspath*, field-spar), a mineral extremely abundant in almost all parts of the world. It is a principal constituent of many rocks, as granite, gneiss, greenstone, trachyte, etc.; and clays seem very generally to have resulted, at least in great part, from its decomposition. It occurs both massive and crystallized, in rhomboidal, pyramidal, and prismatic crystals, often having their edges and angles truncated, and thus very variously modified. There are many different kinds of F., which mineralogists have recently attempted to arrange in mineral species, distinguished by physical and chemical characters, and also by geognostic position, and by the groups of minerals with which they are associated. For these mineral species new names have been invented, *orthoclase*, *oligoclase*, *albite*, *labradorite*, etc. All the feldspars are anhydrous silicates of alumina, and of an alkali or lime. Orthoclase, and the other more silicious feldspars containing potash, abound chiefly in granite and the *plutonic* rocks; the less silicious, containing soda and lime, characterize the *volcanic* rocks—"as labradorite the basaltic group, glassy feldspar the trachytic." All the kinds of F. are so hard as not to be easily scratched with a knife, and are fused with difficulty. Some of them are soluble, some insoluble in acids.—The kind known as COMMON F.—referred to *orthoclase*—is generally white or flesh-colored, has a glassy and somewhat pearly luster, is translucent at least on the edges, and has an uneven or splintery fracture. Crystals four or five inches long are found in Aberdeenshire. This variety, under the name of *petunse* or *petuntze*, is used by the Chinese in the manufacture of porcelain; along with some of the quartz which is associated with it in the rock. It is used, with other materials, as a flux; and alone to form an enamel or glassy covering, without which the porcelain would absorb moisture and grease, and would be unfit for any except mere ornamental purposes.—ADULARIA is a transparent and almost colorless variety of F., often cut as an ornamental stone, the finest varieties, of which one is known as MOONSTONE, being prized almost as gems. A variety, found among rolled stones in Ceylon, and remarkable for the reflection of a pearly light, has been sometimes confounded with *cat's eye*.—AVANTURINE F. is similar to the variety of quartz called *avanturine* (q.v.) in the play of light which it exhibits, and which is said to be owing to minute crystals of specular or titanic iron. It is much esteemed as an ornamental stone. A variety with golden yellow specks, called SUNSTONE, is very rare and very beautiful: it sells at a high price.—LABRADORITE exhibits rich colors and a beautiful opalescence, on account of which it is much used for ornamental purposes.—A blue variety of F., found only in Styria, and a green variety, sometimes called *amazon stone*, are also esteemed as precious stones.—All the finer varieties of F. are characterized by a soft beauty, which well compensates for the want of that brilliancy which belongs to the true gems.

Kaolin, or *porcelain clay*, is regarded as a decomposed feldspar.—To F. also are referred, as chiefly composed of it, or apparently derived from it, felstone, trachyte, claystone, clinkstone, pitchstone, obsidian, and pumice.

FELEGYHA'ZA, a t. of Little Cumania, Hungary, is situated on the railway between Pesth and Temesvar, 67 m. s.e. from the former. It has an extensive trade in grain, fruit, wine, tobacco, and cattle. In the neighborhood, several Roman urns have been found. Pop. '69, 21,313.

FELI'CE, FORTUNATO BARTOLOMMEO DE, 1725–89; an Italian author; studied in Rome and Naples under Jesuit teachers. Having abducted a nun from a convent he fled to Switzerland, settled at Berne, and became a Protestant. He subsequently founded a school and a printing-office at Yverdun, where he published a literary periodical and some political works. His chief work was an *Encyclopædia* in 48 quarto vols. with 10 vols of illustrations, in which he was assisted by Euler and others.

FELICITAS, SAINT, a Christian martyr who with her seven sons suffered death in the 2d century. All were arraigned together, and all refused to renounce Christianity. The mother was beheaded, and the sons were killed in various manners. Another St. Felicitas suffered death with St. Perpetua under Caracalla about the beginning of the 3d century.

FELICU'DI. See LIPARI ISLANDS.

FE'LIDÆ, or FELI'NÆ, a family of digitigrade carnivorous quadrupeds (see CARNIVORA and DIGITIGRADA) corresponding to the genus *felis* of Linnæus, and sometimes

collectively called *cats* or the *cat tribe*. They are, generally speaking, the most carnivorous of all the *carnivora*, holding the same relative place among quadrupeds that the *falconidæ* do among birds. Their organization is admirably suitable to their habits. They have a very lithe muscular frame; the body is rather long, and remarkably flexible; the limbs generally short. Few of the species possess much fleetness, but most of them excel in climbing and in leaping. When moving rapidly over the surface of the ground, they generally advance by a series of zigzag bounds, rather than by direct running. They are mostly inhabitants of forests, and many even of the larger species live much among the branches of trees, although some of the largest do not leave the ground. They all advance stealthily on their prey; which all of them kill for themselves, and devour in a perfectly fresh state, and generally whilst still warm and quivering. When they have approached within a sufficient distance, they complete the seizure by a spring, many of them uttering a roar or yell as they do so, and thus rendering their victory more secure by the consternation which paralyzes the object of their attack. Their movements are extremely noiseless, owing to the soft velvety pads with which their toes are provided. Their claws are strong, much curved, very sharp, and retractile; being withdrawn by special muscles and ligaments into sheaths when not in use, and their points even turned upwards, so that they are not blunted by unnecessary friction, and do not interfere with the movements of the animal by accidentally hooking objects which are in the way. The last bone (*phalanx*) and joint of the toe exhibit peculiarities requisite for the extension and retraction of the claws. The fore-feet have five toes, the hind-feet four. The head of the F. is characterized by great breadth of skull, whilst the muzzle is short, and sometimes even rounded; the jaws are moved by very powerful muscles, and the articulation of the lower jaw is such that it has no rotatory motion; the teeth also being so shaped, and those of the two jaws so fitting to each other, that they cut like scissors—the lower teeth shutting within the upper—and are not at all adapted to the trituration of food. There are six small incisors in each jaw, followed on each side by one very large canine tooth, adapted for prehension; and this by two premolars, or false molars, which, particularly in the lower jaw, are compressed and sharp-edged, their edges rising to a central summit, with inferior lateral cusps, so that flesh between them is subjected to a cutting action in various directions. Finally, there is on each side of each jaw one true molar, and in the upper jaw of many species, a second true molar. The crowns of all the teeth are covered with enamel. The tongue is rough, with horny papillæ directed backwards, by which it is fitted for cleaning the bones of the prey. The stomach is simple, the intestines short, and digestion rapid. The senses of sight and hearing are extremely acute; the eyes are adapted to seeing both by day and by night; the sense of smelling is also very acute, although apparently not equal to that of dogs; the sense of taste is supposed to be less acute; the bulbs from which the long whiskers arise appear to possess the sense of touch in great perfection, and the whiskers thus become useful in the progress of the animal through entangled thickets.

The F. agree so much in form and structure, that many naturalists still refuse to divide the Linnæan genus *felis*. None of the F. are gregarious. Almost all of them, when taken young, seem capable of domestication, but in general they are little to be trusted. The species are numerous. They are distributed over Europe, Asia, Africa, America, and the islands adjacent to these continents; but none are found in Australia, where their place is supplied by the carnivorous marsupial quadrupeds. The largest species are chiefly found in warm climates. No species is known to be common to the old and new worlds, although some are very nearly allied.

Vast numbers of the larger F. were brought from Africa and the east for those savage sports and shows in which the ancient Romans delighted. Five hundred lions were slain in five days at the opening of Pompey's theater, and five hundred panthers have been let loose at once in a similar Roman arena. The wealth of Indian princes has also been often spent in fights of such beasts.

The principal F. are noticed in separate articles, as LION, TIGER, JAGUAR, PUMA, LEOPARD, PANTHER, CAT, TIGER-CAT, LYNX, CHEETAH, OUNCE, CARACAL, SERVAL, OCELOT, etc.

FE'LIX (POPE) I.-IV.—FELIX I., reckoned the 26th in the succession of popes, succeeded Dionysius in the see of Rome probably in the year 269. His pontificate is chiefly interesting as an early example of the relations of the Christian church to the Roman empire, and of the recognition by the state of the civil rights of Christians. In the pontificate of F.'s predecessor, Dionysius, Paul of Samosata, bishop of Antioch, had been deposed by a council held in that city. Paul having resisted the sentence, the matter was laid before F., Dionysius being now dead; and, as Paul held possession of the church and church buildings, the bishops were obliged to claim the interference of the emperor Aurelian, who was passing through Antioch on his return from Palmyra. Aurelian returned a decision which is often appealed to in modern controversy, to the effect that the buildings should belong to the person "to whom they should be adjudged by the bishops of Italy and Rome." F. afterwards suffered martyrdom in the persecution of the same emperor, Aurelian, probably in 274.—FELIX II. occupied the Roman

see during the banishment of Liberius, in 355. It is agreed on all hands that his first appointment was intrusive, but much diversity of opinion exists as to his subsequent career. In reply to a petition for the recall of Liberius, it was proposed by the emperor Constantius that Liberius and F. should exercise jurisdiction jointly; but this proposition was rejected by the Romans, and F. appears to have been compelled to retire from the city. According to the *Liber Pontificalis*, he suffered martyrdom in the end, at the hands of his former patron, Constantius; but this is not confirmed by any contemporary authority.—FELIX III. occupied the see of Rome from 483 till 492. He was a native of Rome, and of the family from which afterwards sprung pope Gregory the great. His pontificate is historically memorable, as presenting the first commencement of the disruption of the Greek and Roman churches. The contemporary occupant of the see of Constantinople, Acacius, as well as the imperial court, was a favorer of the Monophysite party, who refused to accept the decision of the council of Chalcedon. See MONOPHYSITES. By their influence, the patriarch of Alexandria was deposed, and replaced by the Monophysite, Peter Mongus. The deposed patriarch having appealed to Rome, F. sent two legates to Constantinople, to require his restoration; and the legates having failed in their trust, and Acacius still adhering to the heterodox party, F. assembled a council at Rome, and excommunicated not only the offending legates, but also Acacius himself, the sentence being pinned by a monk upon the back of the patriarch's robes while he was actually officiating in the church. F. had previously rejected the *Henoticon*, or decree of union, published by the emperor Zeno. The schism thus inaugurated was not healed till the year 519. The only literary remains of this pontiff are the letters and other acts of this controversy. He died Feb. 24, 492.—FELIX IV., a native of Benevento, succeeded John I. in 526. His pontificate presents no noteworthy event. He died in 530.—FELIX V. (anti-pope). See AMADEUS.

FE'LIX, ANTONIUS, a Roman procurator of Judea (51-62 A.D.) in the time of the apostle Paul, was a freedman of the emperor Claudius I. The circumstances under which he received his appointment are related differently by Tacitus and Josephus. His government, politically considered, was in some respects good. According to Josephus and other authorities, he cleared the country of robbers, and vigorously suppressed the chaotic seditions of the Jews; but his cruelty, lust, and greed were unbounded. His wife was Drusilla, a beautiful but renegade Jewess, whom he had induced to abandon her first husband, and to form a questionable connection with himself. It was therefore not at all wonderful that F. should tremble as Paul reasoned of "righteousness, temperance, and judgment to come" (Acts xxiv. 25). He was recalled to Rome, 62 A.D., on account of the accusations preferred against him by the influential Jews of Cæsarea, and narrowly escaped the sentence of death.

FELIX, CELESTIN JOSEPH, a French preacher, b. 1810; studied at Cambrai, and entered the Jesuit novitiate in 1837. He completed his theological studies at Brugelette, Louvain, and Laval, and was appointed professor of rhetoric at Brugelette. In 1851, he preached the advent sermons in the church of St. Thomas d'Aquin, in Paris, and the next year the Lenten lectures in the church of St. Germain de Prés. In 1853, he succeeded Lacordaire and Ravignan in the pulpit of Notre Dame, which he occupied till 1869. He became the superior of his order in Nancy, and in 1871 superior of the Jesuit residence in the rue de Sèvres, Paris. Many of his sermons have been published.

FELIX, MARCUS MINUCIUS, a Roman lawyer and Christian, author of *Octavius*, a dialogue in defense of Christianity. He lived in the early part of the 3d century.

FELIXIANS, a Spanish sect of the latter part of the 8th c., so called from Felix, bishop of Urgel. See ADOPTIAN CONTROVERSY.

FEL'LAH (plural EL FELLAHIN), an Arabic word meaning peasant or agriculturist, specially applied to the agricultural or laboring population of Egypt by the Turks, in a contemptuous sense, as "clowns," or "boors." They form the great bulk of the population, and are descendants of the ancient Egyptians, intermingled with Syrians, Arabs, and other races who have been converted to Islam. In their physical conformation and features, they differ among themselves, those of the northern provinces of the Mediterranean being of whiter hue, while at Assouan they are almost black. They are described as having a large skull, facial angle almost 90 degrees, oval face, arched eyebrows, deep eyes, projecting lips, large mouth, thin beard, short nose, large chest, and small belly; arched back, and small hands and feet, and being of mean height. They form the fourth class of the population, and are distinguished from the Bedouin or free Arabs, who have entered the country later than the Saracenic conquest, and the Arabs of the towns and villages. Their dress consists of a shirt and linen drawers, over which is a larger blue shirt (*herie*), girdled by a leather or stuff belt, which is exchanged in the winter for a coat with sleeves (*zabout*). On their head, they wear the *tarboush*, turban, or a black or gray cap; the women tattoo themselves, and are nubile at an early age, being often married at 11 years, mothers at 12, and grandmothers at 24. The food of the Fellahin consists entirely of vegetables, which they eat in a crude state, dhourra bread, and beans. Even rice is too dear for them, and animal food unattainable. Their

drink is limited to the waters of the Nile and coffee, and the only luxury which they enjoy is the green tobacco of the country; yet on this diet they are robust and healthy, and capable of much labor and fatigue. In their social position, they are inferior to the Bedouin, who, although they will marry the daughters of the Fellahin, will not give to them their own in marriage. They appear to exhibit the moral qualities of the ancient Egyptians, being intelligent, grave, and calm, docile, pliable, and sober on the one hand; and idle, jealous, quarrelsome, satirical, licentious, and of unbending obstinacy, on the other, and inherit the traditional hatred of their ancestors to the payment of taxes, which are often only extorted by the bastinado. Their political condition is most miserable. Each village is governed by a sheik-el-beled, who is responsible to the nazirs and mamours, or district officers, for the conduct of the inhabitants, and their due payment of taxes. So oppressive, indeed, is the taxation and extortion, scarcely $\frac{1}{10}$ of the produce falling to their lot, that it would not be possible for them to live if it were carried to a higher pitch, and none cultivate the lands with diligence unless compelled by their superiors.—Gliddon, *Types of Mankind*, p. 319; Lepsius, *Egypt and Ethiopia*, p. 76; Lane, *Manners and Customs of Modern Egyptians*, pp. 125, 126, 192, 193; Clot Bey, *Aperçu générale*, i. pp. 159, 160.

FELLATAHS, or FOULAHS, a people of Africa occupying the valley of the Niger between Timbuctoo and Dahomey. About the middle of the last century they became converts to Mohammedanism, and, abandoning their nomadic life, formed independent states and conquered some of the neighboring peoples. At present the region under their control is estimated at 300,000 sq.m., and their numbers at 6,000,000. Their color, as a rule, is black, intermixed with a striking copper hue, some of them being hardly more dark than gypsies; and their hair is much less woolly than that of negroes. They live in clean habitations and are industrious. Children of both sexes are taught to read and write. The men wear swords at all times. The Fellatahs are almost constantly at war with the Arabs.

FELLENBERG, PHILIP EMANUEL VON, the founder of the institution for the improvement of education and agriculture at Hofwyl in the canton of Bern, in Switzerland, was b. at Bern in 1771. His father was a man of patrician rank, and in consequence, a member of the government. From him F. received a very careful education; but it was his mother, a great-granddaughter of the famous Dutch admiral, Van Tromp, who inspired him with the ardent desire of being useful to his fellow-creatures. In 1789, he went to the university at Tübingen, for the purpose of studying law, and subsequently traveled in various parts of Europe, taking up his quarters not in the hotels of the large towns, but in the cottages of the peasantry, that he might know at first hand the real condition and the manners of the poor, as well as the kind of education received by those whose life was to be spent in agricultural pursuits. When the revolution of 1798 broke out in Switzerland, F. took part in it for some time; but the faithlessness and want of public spirit on the part of the Bernese government induced him to withdraw from political life altogether, and to devote himself solely to philanthropic schemes. He now purchased the estate of Hofwyl, near Bern, and soon after entered into an alliance with Pestalozzi, the educationist. Their different characters, however, rendered such a union impracticable, and they found it necessary to separate. F. now proceeded with redoubled zeal to increase the produce of his estate by new improvements, to influence the neighborhood by his example, and to make his experiments known to the world by his agricultural treatises. At the same time, he founded an asylum for forsaken children. He also opened a school of theoretical and practical agriculture, and connected with it an institution for the education of the children of the higher classes. The establishment at Hofwyl acquired for its founder a very great reputation, and pupils hastened to it from all quarters. Many foreign princes visited it, and on their return to their own countries, founded similar institutions. In the year 1830, F. founded a school of art, and some years later, an infant school. He died 21st Nov., 1844. The institutions at Hofwyl were continued for some years by his son Wilhelm, and then entirely given up. Compare Hamm, *F.'s Leben und Wirken* (Bern, 1845).

FELLER, FRANCOIS XAVIER DE, 1735–1802; a Belgian Jesuit, educated at Rheims; professor of physical science at Luxemburg and Liege. In 1764, he was professor of theology at Tyrnau, Hungary; but in 1771, he returned to his professorship at Liege, remaining until the suppression of the Jesuits in 1773. He published *Catechism of Philosophy; Historical and Literary Dictionary; Course of Christian Morals and Religious Literature;* and *View of the Congress of Ems.*

FELLOW-COMMONER, a wealthy or married under-graduate of Cambridge, Eng., who pays extra to dine at the "commons" or fellows' table. At Oxford, they are called gentleman commoners.

FELLOWES, ROBERT, 1770–1847; b. England; graduated at Oxford; took holy orders in 1795; but soon afterwards left the established church, with whose doctrines he differed. His own views he gave in *Religion of the Universe*, 1836. Before this he had published *A Picture of Christian Philosophy; Religion without Cant; The Guide to Immortality; Manual of Piety adapted to the Wants and Calculated for the Improvement of all*

Sects of Christians; and *Body of Theology.* He was a liberal benefactor of the university of London.

FELLOWS, Sir CHARLES, an antiquary of considerable reputation, was b. at Nottingham in 1799. In the beginning of 1838, he commenced those travels in the east by means of which his name has been brought so prominently into public notice. His researches were chiefly confined to the western peninsula of Asia Minor, and to the course of the ancient Xanthus, in the s. of that peninsula. Commencing his investigations at Patara, at the mouth of the Xanthus, and proceeding inland along the valley of that river, he discovered, only 9 m. from the coast, the ruins of the city of Xanthus, formerly the capital of Lycia. Fourteen or fifteen miles higher up the river, he met with the ruins of another city, which, from inscriptions, he found to be the ancient Tlos. Having made drawings of some of the fine remains of architecture and sculpture which he found in the ruins of these cities, and copies of some of the inscriptions, F. returned to England, and published *A Journal written during an Excursion in Asia Minor, by Charles Fellows,* 1838 (Lond. 1839). In 1839, he again visited Lycia, and in the course of another excursion, he discovered the ruins of no less than 18 cities, each of which contained works of art. Another journal, entitled *An Account of Discoveries in Lycia, being a Journal kept during a Second Excursion in Asia Minor* (Lond. 1841), was the result of this journey. In 1841, an expedition left England for the purpose of selecting works of art from the ancient cities discovered by F., who accompanied the expedition, and directed its operations. Authorized by a firman from the sultan, they made their selections, and returned in the spring of 1842. Another expedition sent out by the trustees of the British museum brought home 20 cases of marbles and casts in 1844. These remains have been deposited in the British museum in what has been called the Lycian saloon. In 1845, F.'s labors were rewarded by the honor of knighthood. The other works of F. are—*The Xanthian Marbles: their Acquisition and Transmission to England* (1843); *An Account of the Ionic Trophy Monument Excavated at Xanthus* (1848); a reissue of his earlier journals under the title of *Travels and Researches in Asia Minor, particularly in the Province of Lycia* (1852); and *Coins of Ancient Lycia before the Reign of Alexander; with an Essay on the Relative Dates of the Lycian Monuments in the British Museum* (1855). He died in 1860.

FELLOWS, JOHN, 1733–1808; b. Conn. He served in the French war, and was a member of the provincial congress in 1775. After the conflict at Lexington, he led a regiment to Boston, and subsequently commanded a brigade in the battle of Long island, and was in the engagements at White Plains and Bemis Heights. His highest rank was brigadier-general.

FELLOWSHIP. See PARTNERSHIP.

FELLOWSHIP, IN A UNIVERSITY. As the history of this institution will be treated under UNIVERSITY, we shall here only mention its leading characteristics, as it exists in the two great universities of England—Oxford and Cambridge. In these ancient and celebrated seats of learning, the fellowships were either constituted by the original founders of the colleges to which they belong, or they have been since endowed. In almost all cases, their holders must have taken at least the first degree of bachelor of arts, or student in the civil law. One of the greatest changes introduced by the commissioners under the university act of 1854, was the throwing open of the fellowships to all members of the university of requisite standing, by removing the old restrictions by which many of them were confined to founder's kin, or to the inhabitants of certain dioceses, archdeaconries, or other districts. Fellowships vary greatly in value. Some of the best at Oxford, in good years, are said to reach £700, or even £800, whilst there are others which do not amount to £100, and many at Cambridge which fall short of that sum. Being paid out of the college revenues which arise from land, they also vary from year to year, though from this arrangement, on the other hand, their general value with reference to the value of commodities is preserved nearly unchangeable, which would not be the case if they consisted of a fixed payment in money. The senior fellowships are the most lucrative, a system of promotion being established among their holders; but they all confer on their holders the privilege of occupying apartments in the college, and generally, in addition, certain perquisites as to meals or commons. Many fellowships are tenable for life, but in general they are forfeited should the holder attain to certain preferments in the church or at the bar, and sometimes in the case of his succeeding to property above a certain amount. In general, also, they are forfeited by marriage, though this disability may now be removed by a special vote of the college, permitting the fellow to retain his fellowship notwithstanding his marriage. With the single exception of Downing college, Cambridge, in which the graduates of both universities are eligible, the fellowships are confined to the graduates of the university to which they belong.

FE'LO-DE-SE, in English law, is where a man, of the age of discretion, and *compos mentis,* voluntarily kills himself. "No man," says sir M. Hale (*Pl. of the Cr.* 411), "hath the absolute interest of himself, but 1*st*, God Almighty has an interest and propriety in him, and therefore self-murder is a sin against God; 2*d*, the king hath an interest in him, and therefore the injunction in case of self-murder is *felonicè et voluntariè se interficit et*

murderavit contra pacem domini regis." A man or woman is considered of full age in regard to capital offenses at the age of fourteen. A lunatic killing himself during a fit is not guilty of felo-de-se; but a merely melancholy and hypochondriacal temperament is not such a state of mind as will relieve a person from the consequences of this offense. Where two persons agree to die together, and in pursuance of this design one or both die, it is suicide, or felo-de-se. And in some cases, where one maliciously attempts to kill another, and unwittingly kills himself, this is said (Hawkins, P. C. c. 27, s. 4) to be felo-de-se. But as a general rule the act must be voluntary. Therefore, if death ensue from a rash act not intended to kill, as where a man cuts off his hand to prevent a gangrene, and the act is followed by death, this is not felo-de-se. Formerly, the law punished this offense by inflicting ignominy on the body of the offender, which was ordered to be buried by night at four cross-ways, and that a stake should be driven through the body. But by 4 Geo. IV. c. 52, this ignominious mode of burial is abolished, and it is provided that a felo-de-se shall be privately buried at night in a burial-ground. All the chattels, real and personal, of a felo-de-se are forfeited to the crown. In Scotland, the crime of self-murder is known as suicide (q.v.).

FEL'ON AND FEL'ONY. The etymology of the word felon has given rise to much difference of opinion. By the majority of the most reliable lexicographers, it is supposed to have a common root with *fail*, and its original signification was supposed to be a vassal who failed in his fidelity or allegiance to his superior, thus committing an offense by which he forfeited his fee or feud. From this it came to signify traitorous or rebellious, and was gradually generalized till it reached its popular meaning of a crime of so heinous a nature as to infer a capital punishment.

The characteristic distinction of a felony, in the opinion of all legal writers, is, that it is a crime which occasions the forfeiture of the offender's goods. "Felony," says Blackstone, "in the general acceptation of our English law, comprises every species of crime which occasioned at common law the forfeiture of lands and goods. Treason itself, says sir Edward Coke, was anciently comprised under the name of felony. . . . And not only all offenses now capital are in some degree or other felony, but...many other offenses not punishable with death, as suicide, manslaughter, and larceny, as they submit the committers of them to forfeitures." When a person is now convicted of felony, he does not forfeit any of his property; but he forfeits and is disqualified for any government or public office. The court may order him to pay all the costs incurred in procuring his conviction, as well as compensation to persons defrauded or injured by his felonious act. The crown may, during the sentence of imprisonment, or on the execution of the felon, appoint administrators to take possession of all his property, and hold it until the sentence expires, dealing with his affairs as if he were bankrupt, by paying his debts; and if there is a surplus, keeping or reassigning it for him or his heirs and representatives at the expiration of the sentence, 33 and 34 Vict. c. 23. Similar arrangements do not apply to Scotland.

FELSING, JAKOB, b. 1802; a German engraver, a pupil of his father and of the Milan academy. He was noted for the accuracy with which he reproduced the peculiar characteristics of paintings which he engraved, some of which were Correggio's "Marriage of St. Catherine," Carlo Dolci's "Christ on the Mount of Olives," Raphael's "Violin Player," and Overbeck's "Holy Family."

FELSPAR. See FELDSPAR, *ante*.

FELSTONE, a name introduced by prof. Sedgwick to designate those rocks which are composed, either in whole or to a large extent, of felspar. When they consist of a compact and apparently amorphous felspar, they are known as trachytes—a variety of this rock, which splits into small slabs, that ring with a metallic sound, is called phonolite. Trachyte, with distinct crystals of felspar scattered through it, becomes feltstone porphyry; when the rock is in a vitreous condition, and has a resinous luster, it is pitchstone. Even in the most compact felstones, minute crystals may be detected, and these sometimes increase in size, till we have varieties which are completely granular and crystalline.

FELT—FELTING, a fabric formed without weaving, by taking advantage of the natural tendency of the fibers of hair and wool to interlace with and cling to each other. The hatters' tradition concerning the invention of felt affords as good an illustration as any we can find of the principle of this manufacture. In most Roman Catholic countries, the hatters celebrate as a festival the 23d of November, St. Clement's day, as they formerly did in this country; and it is stated that St. Clement, when on a pilgrimage, put carded wool between his feet and the soles of his sandals, and found on his journey's end that the wool was converted into cloth. Although this tradition is very questionable, as the manufacture of felt is of far more ancient origin, there can be no doubt that if carded wool were thus continually trodden, and at the same time moistened, it would become felt, and all the manufacturer's processes of felting are but modifications of such treatment.

This matting or felting of the fibers of hair and wool results from their structure, for, when examined by the microscope, the hair of all animals is found to be more or less jagged or notched on its surface; in some animals it is distinctly barbed; and this

structure is so directed that the teeth or barbs all point towards the tip of the hair. See HAIR. If a piece of human hair (in which this structure is less marked than in most animals) be held between the finger and thumb, and rubbed in the direction of its length, it will invariably move between the fingers in the direction of its root; for the skin, while moving towards the tip of the hair, slides freely upon it, but moving in the other direction, against the inclination of the barbs, it brings the hair with it. It will be easily understood that when a number of hairs are pressed together, those which lie in opposite directions to each other and in contact will interlock at these barbs or teeth, and thus resist any effort to tear them asunder. When once this close contact and interlocking is established between any two or more hairs, they remain attached, but the others that are differently arranged, or not in contact, will still be free to move upon each other; and therefore, if subjected to continual blows, pushing, and pressure, like the treading of the feet in walking, the unattached hairs will be continually shifting until they reach others in suitable positions for clinging together, either by crossing obliquely or by lying in the same line, and overlapping at their ends or any other portion. When the hair has a natural tendency to curl, the felting is still more readily brought about by the additional interlacing. This is the case with wool to such an extent, that when free from grease it cannot be retained in the straight carded condition required for spinning and weaving. When it is required to be felted, the natural grease has to be removed. This tendency to felt is shown in the hard lumps formed in wool-mattresses that have been long used.

The beaver-hat maker produces his felt by taking a few ounces of the mixed fur, distributing it in an even layer by twanging a bowstring against the heap, and then condensing this into a felt by a sort of kneading process with his hands. See HAT.

The felt now extensively used for carpeting and other purposes is made by machinery, chiefly from the waste wool from the weaving-mills. Many patents have been taken out for the various details of felting machinery, but the main principle is the same in all. The wool is carded more or less perfectly, and steamed or moistened with hot water, and passed between beaters, which act like the pilgrim's feet in the manner already described. When used as drugget for covering carpets, or as a substitute for carpet, the felt is printed by means of blocks with various patterns, or simply dyed. Felt is also used for padding coats and other garments, sometimes for cloaks and capes; for table-covers, some of which are beautifully embossed and printed; for carriage linings, upholstery work, polishing cloths, pianoforte hammers, and various other purposes where a coarse or thick cloth is required. A simple kind of saddle, cut out of very thick felt, is in common use in South America.

The "felted sheathing" used as a non-conducting covering for retaining the heat in steam-boilers, is a substance intermediate between felt and paper, being composed of the commonest woolen refuse from paper mills, etc., made into a semi-pulp, and beaten to produce a partial felting. This when dried hardens, and though possessing but little tenacity, and unfit for the wear of friction, is, from its compactness, better adapted than ordinary felt for the purposes to which it is applied.

Asphalted roofing-felt is a very coarse felt saturated with pitch, asphalt, or coal-tar—usually the latter, on account of its cheapness; it is retailed at one penny per foot, and used for covering sheds and other buildings. A more expensive kind, free from coal-tar, is call *inodorous felt*, and used as a lining for damp walls upon which paper has to be hung. Asphalted felt is also used as a flooring for granaries and similar buildings, and has been recommended for public schools, to prevent the noise from the shuffling of the children's feet.

FELTON, CORNELIUS CONWAY, LL.D., 1807–62; b. Mass.; graduated at Harvard, 1827; and taught in Northampton, Mass., and at Geneseo, N. Y. In 1829, he was Latin tutor at Harvard; in 1830, Greek tutor; in 1832, he became Eliot professor of Greek; and in July, 1860, was inaugurated president. Among his publications were *Homer, with English Notes and Flaxman's Illustrations; Menzel's German Literature; Clouds of Aristophanes; Ancient Literature and Art; Poets and Poetry of Europe; Panegyricus of Isocrates; The Agamemnon of Æschylus;* and *Guyot's Earth and Man.* In 1853–54, he made a European tour; in 1855, he revised for publication Smith's *History of Greece,* with an edition of lord Carlisle's *Diary in Turkish and Greek Waters.* A selection from modern Greek writers was published by him. Other works of his were *Life of Gen. Eaton* in Spark's *American Biography;* addresses; and contributions to the *North American Review.* He was a member of the Massachusetts board of education, regent of the Smithsonian institution, and a member of the American academy of arts and sciences.

FELTRÉ, a t. of northern Italy, in the province of Belluno, is situated near the right bank of the Piave, 44 m. n.n.w. of Venice. It suffered severely from the attacks of the Goths in the 5th century. The chief buildings are the cathedral, the college, ecclesiastical seminary, and gymnasium. F. has some trade in corn, wine, and oil. Pop. 6,500.

FELTRE, MORTO DA, an Italian painter who lived about the close of the 15th and opening of the 16th century. At an early age he went to Rome and investigated the ancient, especially the subterranean remains, and thence to Pozzuoli, where he painted from the decorations of antique crypts or "grotte." The style of fanciful arabesque which he formed for himself from these studies gained the name of "grottesche,"

whence comes "grotesque;" not, indeed, that Morto was the first painter of arabesque in the Italian renaissance, for art of this kind had, apart from his influence, been fully developed, both in painting and in sculpture, towards 1480; but he may have powerfully aided its diffusion southward. His works were received with much favor in Rome. He afterwards went to Florence, and painted some fine grotesques in the Palazzo Pubblico. Returning to Venice towards 1505, he assisted Giorgione in painting the "Fondaco dei Tedeschi," and seems to have remained with him till 1511. If we may trust Ridolfi, Morto eloped with the mistress of Giorgione, whose grief at this transaction brought him to the grave. The allegation, however, is hardly reconcilable with other accounts. It may have been after 1511 that Morto returned to his native Feltre, then in a very ruinous condition from the ravages of war in 1509. There he executed various works, including some frescoes, still partly extant, and considered to be almost worthy of the hand of Raphael, in the loggia beside San Stefano. Towards the age of 45, Morto, unquiet and dissatisfied, abandoned painting and took to soldiering in the service of the Venetian republic. He was made captain of a troop of 200 men; and, fighting valorously, he died at Zara, in Dalmatia, in 1519, or perhaps somewhat later. One of his pictures is in the Berlin museum, an allegorical subject of Peace and War. (From *Ency. Brit.*, 9th ed.)

FELUCCA, a small class of vessel used in the Mediterranean. It is propelled by from 10 to 16 oars, and by lateen sails. It has frequently a rudder at each end, to be applied as occasion demands. During the French war, feluccas were armed with a heavy gun or two, and sent out as gun-boats against our ships, when becalmed near the Spanish ports; from their speed in smooth water, and the difficulty of hitting them, they were very troublesome antagonists.

FEMALE LABOR is prohibited in mines and collieries since 1st Mar., 1843 (5 and 6 Vict. c. 99), under heavy penalties. As to the limits under which it is permitted in factories, see FACTORY ACTS and WORKSHOP REGULATION ACT.

FEMALE SHERIFF. There is only one instance on record of the office of sheriff in England having been held by a female; this was in the case of Anne, countess of Pembroke. This lady, who was distinguished during the rebellion in the reigns of Charles I. and II. by her stanch adherence to the royal cause, was the wife of Philip, fourth earl of Pembroke, and daughter of the earl of Cumberland. On the death of her father, without male issue, in 1643, she succeeded to the hereditary office of sheriff of Westmoreland, and in that character she attended the judges of assize, and sat with them on the bench at Appleby.

FEMALE WHIPPING, as a public punishment, was abolished by 57 Geo. III. c. 75; and by 1 Geo. IV. c. 67, it was enacted that no female offender should suffer the punishment of being whipped either publicly or privately; but that imprisonment or solitary confinement should be substituted therefor. See WHIPPING.

FEME COVERTE (*fœmina viro co-operta*). In the language of the law of England, a woman by her marriage becomes subject to her husband, who has the control of her person, and is entitled to fix her residence. This control in the husband is admitted to a certain extent in criminal cases to excuse a married woman from guilt. Thus, in any felony, except murder or manslaughter, committed by a married woman, in presence of her husband, it is assumed that she acted under his compulsion. But this presumption may be rebutted by evidence that she was the principal agent in the crime. A married woman cannot, in criminal cases, be a witness for or against her husband, except when he is tried for violence against her. In civil cases, a married woman may be examined in a suit where her husband is a party. In a petition for divorce on the ground of adultery, a married woman is not a competent witness; but where cruelty forms one of the grounds of complaint, she may be examined on that subject. Her property is to a limited extent transferred to the husband. By 7 Will. IV. and 1 Vict. c. 26, even a will made before marriage is revoked by the marriage. But a deserted wife may, by 20 and 21 Vict. c. 85, s. 21, obtain an order to protect any money acquired by her own industry. By 33 and 34 Vict. c. 93 (1870) it is possible for a woman to retain her personal earnings, and gifts made to her during marriage in her own right (see HUSBAND AND WIFE). The landed property of a married woman is, during the marriage, under the administration of the husband, and during their joint lives, he is entitled to all the profits of the lands. Should there be a child of the marriage born alive, and capable of inheriting the lands, he has, by the courtesy of England (see COURTESY IN LAW), an estate for life in all lands in which he is seized in fee in her right. Formerly, a married woman could not, during marriage, execute a conveyance of lands without levying a fine (q.v.); but by 3 and 4 Will. IV. c. 74, a married woman may now make a disposition of real estate as if she were a *feme sole*. But the husband must concur in the deed, which must also be acknowledged by the wife, in presence of one of the judges, a master in chancery, or of a commissioner appointed under the act. Formerly, an action could not be maintained by a married woman unless with the concurrence and in the name of the husband. A married woman may now maintain an action and other remedies in her own name, as regards her separate estate. A married woman cannot bind her husband by any contract she may enter into, but as he is bound to support her, he

is liable for necessaries supplied to her while she lives with him, or if he willfully deserts her, but not where she has left him of her own accord. Formerly, a wife could not obtain a divorce from her husband; but by 20 and 21 Vict. c. 85, she may now obtain a divorce on the ground of adultery, coupled with cruelty or desertion. See DIVORCE. For the law of Scotland in regard to the rights of married women, see HUSBAND AND WIFE.

FEMERN, an island in the Prussian province of Schleswig-Holstein, taken from Denmark in 1864. It is separated from Holstein by a strait called the Femern sound, has an area of 70 sq.m., and a pop. of about 10,000. The island is flat, fruitful, and destitute of wood. Agriculture, fisheries, and stocking-weaving for exportation, form the principal employments of the inhabitants. The chief town is Burg, which has about 2,500 inhabitants.

FEMGERICHTE (derived from the old German *fem*, punishment, and *gericht*, court of justice), spoken of as the holy feme (or fehme), and also known as the Westphalian or secret tribunals, were among the most remarkable phenomena of the middle ages, and supplied the place of the regular administration of justice, then in a deplorable condition. The origin of these courts has been ascribed to Charlemagne, who, it was pretended, had instituted them to prevent the relapse into paganism of the Saxons who had been forcibly converted to Christianity. It is more probable, however, that they were a relic of the ancient German free courts of justice, the preservation of which may have been favored in Westphalia by special circumstances.

When Henry the Lion was put under the ban of the empire, and deprived of his possessions in 1179, Westphalia, which then comprised nearly the whole district between the Rhine and the Weser, was granted to the archbishop of Cologne; and from this time the secret tribunals gained in importance. In the general confusion which then prevailed in Germany, when all laws, both civil and ecclesiastical, had lost their authority, and the fabric of society seemed on the point of toppling into ruins, the F. were organized for the purpose of arresting and controlling the incipient anarchy that threatened to bring chaos back again, and of inspiring with feelings of salutary terror, through the agency of their mysterious powers and solemn judgments, all rapacious and lawless persons (but especially the feudal barons) who—on account of the impotence of the ordinary legal checks—committed crimes with impunity. In the causes, therefore, which led to their formation, and in their general design, the F. resemble the Hanseatic towns. They soon acquired tremendous influence, the emperors themselves having recourse to their assistance against powerful and rebellious nobles. It was in the 14th and 15th centuries, however, that they attained the summit of their dread authority, when they began to extend themselves over the whole of Germany. Beneficial as in many instances the proved to be, they could not fail, in the long-run, to degenerate, and to be frequently employed as a cloak to self-interest and malice. It is therefore by no means surprising that many voices were raised against them, and that in 1461 various princes and cities of Germany, as well as the Swiss confederates, formed unions for affording justice to every individual, and preventing any from seeking it from the secret tribunals. Particular classes likewise obtained imperial letters of protection against the pretensions of these tribunals. The emperors themselves, however, could go no further than to make some unavailing attempts to introduce improvements into the constitution of the F., as the latter were bold enough to oppose the imperial authority, and even summoned the emperor Friedrich III. to appear before them. Their influence came to an end only when the public peace (*landfriede*) was established in Germany, and an amended form of trial and penal judicature was introduced. The last real F. was held at Celle in Hanover, in the year 1568. A remnant of the institution, however, existed in Westphalia until the year 1811, at which time it was performing the function of a society for the suppression of vice, when it was abolished by an order of Jerome Bonaparte. Beyond the limits of Westphalia, notwithstanding all their endeavors, the F. never succeeded in fully establishing their authority; and even in the *Red Land*, as Westphalia was called (probably from the color of the soil), they were restricted by the imperial privileges on which they founded their authority.

The members of the feme were called *wissende*, "the knowing ones," or the *initiated*. It was necessary that they should be born in wedlock, be of the Christian religion, lead a blameless life, and bind themselves by a tremendous oath "to support the holy feme, and to conceal it from wife and child, father and mother, sister and brother, fire and wind, from all that the sun shines on and the rain wets, and from all that is between heaven and earth." Originally, none but an inhabitant of the "Red Land," possessed of real property, could be admitted a member of the wissende; at a later period, this rule was relaxed. From the general body were elected officers called *freischöffen* (free justices), who were assessors of the court and executors of its sentences. The presiding judge was called the *freigraf* (free count). The general superintendence and presidency of the secret tribunals belonged to the lord of the land, i.e., in Westphalia, to the archbishop of Cologne. The highest office, however, as supreme president, was nominally held by the emperor, who was usually elected into the number of the wissende on the occasion of his coronation at Aix-la-Chapelle. The court of a freigraf was called *freiding* (a free court of justice), and the place where he held court a *freistuhl* (free bench or court).

One of the most celebrated free courts had its seat at Dortmund. The sittings of the tribunal were either open or secret. The former were held by day in the open air, and decided in civil disputes: the secret tribunals took cognizance of those who had been unable to prove their innocence in the open courts, as well as of those who were accused of heresy, sorcery, rape, theft, robbery, or murder. The accusation was made by one of the freischöffen, who declared, upon oath, that the accused had committed the crime. The citation was secretly affixed, with symbolical signs, to the door of the accused, who was to meet the wissende at a certain hour and place, and be conducted by them before the tribunal. The accused could now clear himself by an oath, but the accuser and witnesses could oppose this with another. If the accused could now bring forward six witnesses to swear in his favor, the accuser could strengthen his oath with 14 witnesses; and it was not till after 21 witnesses had made their affidavit in his favor that sentence of acquittal necessarily followed. The persons convicted, as well as those who refused to obey the summons, were given over to the freischöffen. The first freischöffe who met him was bound to hang him on a tree, or, if he made any resistance, to put him otherwise to death. A knife was left by the corpse, to show that it was not a murder, but a punishment inflicted by one of the freischöffen. Compare Wigand, *Das Fehmgericht Westfalen's* (Hamm. 1825), and Usener, *Die Frei- und heimlichen Gerichte Westfalen's* (Frankfort, 1832); Geisberg, *Die Fehme* (1858).

FE'MUR, the thigh-bone in human anatomy. In general terms, it consists of a shaft very slightly curved, and two extremities. The upper extremity bears two projections, called the greater and lesser *trochanters*, for the attachment of muscles, and a short *neck*, nearly at right angles to the shaft, terminated by a hemispherical *head*, which being received into a cavity of the pelvis called the acetabulum, forms the hip-joint, a ball-and-socket joint. The lower extremity of the femur has on each side an enlargement called a *condyle*, or knuckle. The articular surface of the condyles is hemicylindrical, as also is the somewhat depressed space between them, called the *trochela*, and with the large bone of the leg, called the *tibia*, forms a hinge joint. The femur is attached to the pelvis by two ligaments—a capsular ligament, which incloses the head and neck, and the *ligamentum teres*, a sharp ligament which joins the head with the bottom of the acetabulum. It is attached to the tibia by several ligaments, placed in different positions, to combine strength with freedom of motion, the most important of which are the lateral ligaments and the crucial ligaments. The crucial ligaments cross from one member of the joint to the other in oblique directions. Powerful extensor and flexor muscles, besides performing their ordinary functions, aid in keeping the parts in opposition. The femur has a wide range of distribution in the animal kingdom, and is not the exclusive property of warm-blooded animals. In man, it is the strongest, longest, and largest bone. In the whale, it is only rudimentary. In fishes, it is not represented, but has a varying importance in mammals, birds, reptiles, and amphibians. It is a short bone in the ruminants and horse family. In the tortoises, the curve is considerable, while it is almost straight in carnivora, bats, etc. In many reptiles it is slightly rudimentary.

FENCES, in agriculture, serve the twofold purpose of inclosing animals on pasture-grounds, and of protecting land from straying animals. They are formed of a great variety of materials, and of very different structure. In countries where wood or stones are scarce, more especially where they have been long settled, hedges, formed of various kinds of plants, are common. These, when well kept and managed, give a clothed and picturesque appearance to the landscape. The hawthorn is the favorite hedge-plant in this country. See HEDGES.

When stones are used as F., they are built as walls. The form and mode of building varies with the nature and quality of the stones, and the degree of taste and nicety required. Aberdeenshire forms it walls or dikes surrounding its fields with the granite boulders that are strewed over the surface of the country. The graywacke affords slaty stones, which give the walls their peculiar form in other parts, and so with the various kinds of sandstone.

In new countries, where wood is abundant, the F. are all of this material. The snake-fence, named from its zigzag form, is made by merely laying the ends of trees above each other, and requires no other means of fixing. As wood becomes more valuable, it is made into stobs and rails. The stobs are driven into the ground from two to three yards apart, and from four to five rails are nailed across, according to the purpose it is meant to serve. The stob and rafter fence is made by driving the stobs from 3 to 4 in. apart, and binding the whole by a rafter or rail nailed across the top. This is one of the strongest of wooden F., but requires more material than the other.

Iron or wire fencing has come much into use of late. Vast stretches of waste land in this country, as well as pastures in Australia, have been inclosed by means of wire-fencing. Strong wires are stretched on posts firmly secured in the ground, from 100 to 200 yards or more apart. Intermediate or lighter posts are put in at from two to three yards' distance. After the wires are fully stretched, they are fixed to the smaller posts; when of wood, by means of staples, or threaded through when of iron.

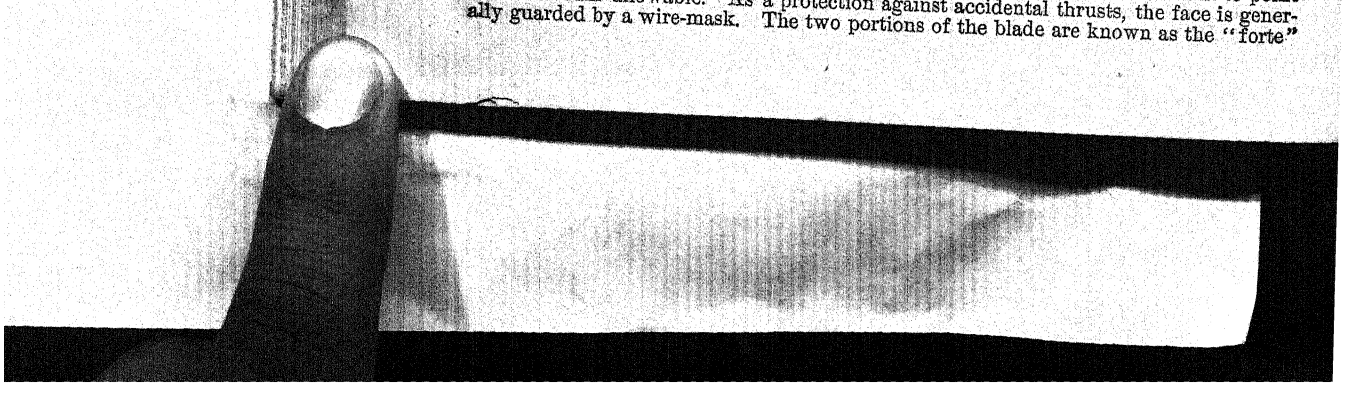
Law regarding Fences.—In England, it is held to be the duty of the occupier of lands to repair and uphold F., and not of the landlord; and without any special agreement, the landlord may maintain an action against the tenant for not doing so. Though a

tenant from year to year is not bound to put the F. and other buildings on his farm into repair, he must not do anything that amounts to waste, or to a breach of the rules of good husbandry. He cannot cut and sell hedgerows, or if he does so, he must make up the hedges and F. according to the course of good husbandry. "If there be a quick-set fence of white thorn, and the tenant shut it up, or suffer it to be destroyed, this is destruction; but cutting up quicksets is not waste, for it preserves the spring."—Woodfall *On Landlord and Tenant*, pp. 456, 457, and cases cited. Where, in answer to a declaration against a tenant for not using premises in a husbandlike manner in repairing F., on his implied obligation to do so, the tenant pleaded that the fence became out of repair by natural decay, and that there was no proper wood which he had a right to cut for repairing the F., and that the plaintiff ought to have set out proper wood for the purpose of repairs, which he had neglected to do, the plea was held to be bad, because it did not aver any request to the plaintiff so to do, or a custom of the country in that respect.—Whitefield *vs.* Weedon, 2 Chit. 685. By 7 and 8 Geo. IV. c. 29, ss. 23, 40, 44, the destruction of F. is declared to be punishable summarily with a fine of not more than £5; or in the case of a deer-park fence, with £50. The statute is limited to England.

In Scotland, the landlord is held bound to put the fences on the farm in due repair on the entry of the tenant, independently of any stipulatian in the lease; whilst the tenant must maintain them and leave them, with the exception of ordinary tear and wear, in the state in which they were given over to him. But the landlord is not entitled to increase the burdens of his tenant by erecting new fences not stipulated for, unless they be march-fences, which he may be compelled to erect by contiguous proprietors, and half the expense of which he must share with them, under the act 1661, c. 41, ratified by 1685, c. 39, of the existence of which the tenant is presumed to have been aware when he entered to the farm. As regards fences erected spontaneously by the tenant, the rule is that if, being entitled to remove them, he allows them to remain, he must leave them in repair; but if they are fixtures (q.v.), which he is not entitled to remove, he is not bound to repair them. It is optional to the landlord, at the termination of the lease, to order removal of fences and other buildings voluntarily built by the tenant, except in the case of palings and movable fences, or to prevent their being removed without offering any indemnification.—Hunter, *Landlord and Tenant*, ii. p. 208. As buildings, fences, and other ameliorations made by the tenant, are supposed to be made for his own sake, and not for the sake of the landlord, he has no claim for the moneys which he may have expended for such purposes, at the end of the lease; except under a special stipulation to that effect. But if the tenant's occupation be terminated abruptly, and more particularly if his lease excludes assignees and sub-tenants, it is equitable that the landlord, getting the benefit beyond what was contemplated by the tenant, the family or the creditors of the latter should be allowed a proportion of the value of the ameliorations. Bell's *Princip.* s. 1255. The cases in which meliorations are or are not removable will be explained under fixtures (q.v.). For the law as to fences in regard to trespassing, see TRESPASS.

FENCIBLE, a word, of doubtful origin, meaning defensive. Regiments raised for local defense, or at—and only for—a special crisis, used to be denominated "fencible." In the last French war, the local, as distinguished from the general militia, was called fencible, and many of the volunteer corps styled themselves the "royal ——shire fencible infantry." The only regiment of this character still bearing the title is the "royal Malta fencible artillery."

FENCING may be described, for a general definition, as the art of defending one's own body or assailing another person's in fair fight by the aid of a side-weapon—i.e., by a sword, rapier, or bayonet. Technically, F. is usually limited to the second of these; and works on the art touch only on attack and defense with the foil in pastime, and the rapier in actual personal combat. The present opportunity will, however, be taken to introduce the elements of single combat with foil, sword, and bayonet. The objection formerly existed that instruction in F. encouraged a propensity to dueling; but as that absurdest of absurd customs has entirely ceased—at least in Britain—to demand its annual victims, no such objection now holds. F. may therefore be safely learned and taught as an elegant and manly accomplishment, developing gracefulness and activity, while it imparts suppleness to the limbs, strength to the muscles, and quickness to the eye. This regards F. with the foils (the rapier has disappeared with the duels which employed it); but instruction in F. with the sword and bayonet, while conferring the same advantages, has in addition the recommendation of helping to fit the student for taking an active part in any general national defense that political circumstances might render necessary. The foil (q.v.) is a circular or polygonal bar of pliable and very highly tempered steel, mounted as any other sword, and blunted at the point by a "button," to prevent danger in its use. From its nature, the foil can only be employed in thrusting, and, being edgeless, it can be handled without liability to cutting wounds. The length of the blade should be proportioned to the height of the person using it—31 in. being the medium length for men, and 38 in. from hilt to point the maximum allowable. As a protection against accidental thrusts, the face is generally guarded by a wire-mask. The two portions of the blade are known as the "forte"



and the "feeble;" the first extending from the hilt to the center, and the other from the center to the point.

In drawing, advance the right foot slightly to the front, take the scabbard with the left hand, raise the right elbow as high as the shoulder, seize the hilt with right hand, nails turned inward, and having drawn the foil, pass it with vicacity over the head in a semicircle, and bring it down to the guard (of which presenly) with its point towards the adversary, not higher than his face, nor lower than his lowest rib. Simultaneously with the weapon being brought into position, the left hand with fingers extended should be raised to a level with the head, as a counterpoise in the various motions to ensue. In establishing the position of guard, the right foot must be advanced 24 in. before the left, the heels in a straight line, and each knee slightly bent, to impart elasticity to the movements, but not too much, lest the firmness of the position be diminished.

In F., there are three openings or entrances—the *inside*, compromising the whole breast from shoulder to shoulder; *outside*, attackable by all the thrusts made above the wrist on the outside of the sword; and the *low parts*, embracing from the armpits to the hips. For reaching and guarding these entrances, there are five positions of the wrist—prime, seconde, tierce, carte (quarte), and quinte. The most important, and those to commence with, are carte and tierce, from which are derived the subordinate positions of carte over the arm, low carte, and flanconnade or octave.

To engage is to cross swords with your adversary, pressing against his with sufficient force to prevent any maneuver taking you unawares. To disengage is to slip the point of your sword briskly under his blade, and to raise it again on the other side, pressing in a direction opposite to that of the previous case.

The guard in each position is a passive obstruction to the opposing thrust; the parade is an active obstruction, in which the guard is first assumed, and the blade then pressed outward or inward by a turn of the wrist against the adversary's sword, so that when thrust at your body it shall be diverted from its aim, and held off. The parade may therefore be regarded as a mere extension of the guard. If the parade were called the "parry," it would convey its meaning more readily to English ears. Another, and perhaps more appropriate name for thrust, is the "lunge" or "longe," as the thrust is almost always accompanied by a lunge forward of the right foot, to give at once greater force and longer command to the blow.

The following are directions for the principal guards and thrusts.

Carte, Guard.—Turn wrist with nails upwards; hand on a line with lower part of breast; arm somewhat bent, and elbow inclined a little to the outside; point of foil elevated at an angle of about 15°, and directed at upper part of adversary's breast.

Thrust.—Being at the guard in carte, straighten the arm, raise the wrist above the head, drop the foil's point to a line with the adversary's breast, throw first the wrist, and then the whole body, forward by a lunge of the right foot of 2 ft. from the "guard," the left foot remaining firm. The left hand should be dropped during the lunge to a level with the thigh, and to a position distant about a foot from the body; it will then afford a good counterpoise to the sword-arm. During the whole action, the body must be perfectly upright. When performed briskly, it appears that the point and foot are advanced simultaneously, but in fact the point has, or should have, priority, in order that the instantly following lunge may drive it home. Most of these observations concerning thrust in *carte* apply equally to all other thrusts.

Carte over the arm is a variety of this thrust. The sword is driven outside the adversary's blade, from the carte position, but in the tierce line.

Low Carte.—Engage adversary's blade in carte, then drop point under his wrist, in a line to his elbow, and thrust at his flank, the body being considerably bent.

Flanconnade or Octave.—Engage adversary's blade in carte, and bind it with yours, then carry your point behind his wrist and under his elbow: without quitting his blade, plunge your point to his flank.

Tierce, Guard.—As in carte, the nails and wrist being somewhat more downward, and the arm stretched a little outward, to cover the outside.

Parade.—Move arm, from the guard, obliquely downward to the right about 6 in., and oppose the inside of the adversary's blade.

Thrust.—From the guard, turn wrist with nails downward, the same height as in carte, the inside of the arm in a line with the right temple; then thrust and lunge as in carte.

Seconde, Parade.—Nails and wrist downward, hand opposed outward, and blade, pointing low, should form an angle of about 45° with the ground.

Thrust.—The same as tierce, but delivered under the adversary's wrist and elbow, to a point between his right armpit and right breast: the body to be more bent than in carte or tierce.

Prime, Parade.—In using prime to parry the thrust in seconde, pass your point over the adversary's blade, lower it to the waist, keeping your wrist as high as your mouth, nails downward, elbow bent, and body held back as far as possible. The left foot should also be drawn backward a few inches, to remove the body further from the hostile point.

Thrust.—An extension movement from the parade.

Quinte, Parade.—Wrist in high carte, sword-point low, and oppose adversary from the forte of the outside edge of your blade.

Thrust.—Make a feint on the half-circle parade, with the wrist in carte; disengage your point over the adversary's blade, and thrust directly at his flank.

Half-circle, Parade.—One of the principal defensive parades: straighten arm, keep wrist in line with shoulder, nails up: by quick motion of wrist sweep point from right to left in a circle covering your body from head to knee, until the adversary's blade is found and opposition established.

The parades parry thrusts as follows:

Carte, with wrist low, parries low carte and seconde; with wrist raised, all the thrusts over the point on the inside of the sword and the flanconnade.

Tierce parries high carte; with raised wrist, parries tierce.

Seconde parries all lower thrusts, both inside and outside.

Half-circle parries carte, high carte, tierce, and seconde.

Prime parries carte, low carte, and seconde.

Quinte parries seconde and flanconnade.

In all parades or parries, care must be taken that in covering the side attacked, the parade is not so wide as to expose the other side to the enemy. A steady countenance, showing no disquietude at any attempt he may make, is, above all, necessary in parades.

Every parade has its return, which should be made with vivacity and decision. A thrust can be returned when the adversary thrusts, or when, baffled in his attack, he is recovering to his guard. In the first case, no lunge is necessary, the return being made from the wrist: this return requires great skill and quickness, since the adversary should receive the thrust before, by finishing his own, he has touched your body.

Ordinary Returns.—After carte parry, return in carte; after tierce, return in tierce; after parrying high carte, return seconde; after parrying seconde, return in quinte; after parade in prime, return seconde or low carte.

Feints, of which there are many varieties, consist in threatening an attack on one side of the sword, and then executing it on the other. The best parade against a feint is that of the half-circle, which will be sure to find the adversary's point.

Advance and Retreat are motions of attack or withdrawal, performed by advancing the right, or withdrawing the left foot suddenly about 18 in., and instantly following it with the other foot. As the adversary advances, you must retreat, unless prepared to receive him at the sword-point.

Salute.—The salute is a courteous opening of the fencing, and consists in gracefully taking off the hat, while, with the foils, your adversary and yourself measure your respective distances.

Appels or beats with the right foot, *beats* on the adversary's blade, and *glissades* or glidings of one sword along the other, are motions intended to confuse the enemy, and give openings for thrusts.

Voltes, *demi-voltes*, and *disarming*, were maneuvers formerly taught with care, but they are now quite discarded in the academies of England and France, as useless and undesirable.

In Spain and Italy, considerable differences of practice from that in France and England prevail. The left hand is used as an auxiliary in parrying, and in Italy is aided by a dagger, or sometimes a cloak. The Spaniard, though trusting to his sword and left hand only, has his blade 5 ft. long, with sharp edges; his guard is nearly straight, and one of his favorite attacks is by a *cut* (not thrust) at the head.

In an article limited in length as this must necessarily be, it is impossible to give more than the merest outline of the various motions; but, of course, in actual practice, there are endless variations of the different modes of attack and defense, which will be severally adopted according to the skill and option of the fencer. There is no finer indoor exercise than F., as the muscles in every limb are developed and strengthened by it. The great requirements for success are a steady eye and hand, a quick purpose as quickly executed, and perhaps, above all, perfect equanimity of temper.

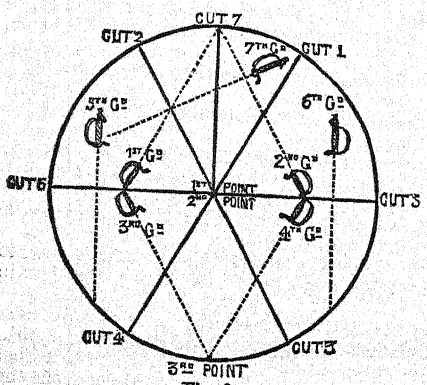


Fig. 6.

The Sword Exercise differs from F. with the foil; in that, the weapon employed has one cutting edge as well as a point, and is therefore intended to cut and thrust. The sword is the arm of all officers in the army and navy, of many non-commissioned officers, and constitutes the sole mode of attack and defense for the officers of the British volunteers. A certain degree of proficiency in its use is therefore always serviceable. In practice, the usual substitute is a stout, straight stick, called a "single-stick," having a basket-handle to protect the knuckles.

The position of the combatant is the same as that assumed in F. with the foil; the lunge is similar, as are also the "advance" and "retreat," and other minor points. According to the instructions of drill masters, there are seven cuts, with seven corresponding guards, and three thrusts. The theoretical directions of all these are shown on the accompanying diagram, which represents a target placed opposite a pupil, so that he may see the motions he is expected to perform displayed before him. The center of the target is supposed to be in a line with the center of his breast.

The cuts proceed from the circumference towards the center along the *thick* lines. Nos. 1, 3, and 5 are inside cuts, and attack the left cheek, left side, and inside of the right leg respectively; 2, 4, and 6 are outside cuts, attacking the enemy's right cheek, right side, and right leg on the outside. No. 7 is a vertical cut, aimed at the head.

The dotted lines show the position of the sword in the several guards by which the cuts are opposed. The sword-handles illustrate the situation of the right hand with reference to the center of the body.

The points or thrusts are shown by the black circles. That towards No. 1 should be directed with the wrist and edge of the sword upwards to the right; towards 2, with the edge upwards to the left; and in the 3d point, with the wrist rising to the center, and the edge upwards to the right.

The "parry" is an additional defensive movement, and consists in bringing the wrist nearly to the right shoulder; whence, as center, a circular sweep of the sword is made from left to right.

A considerable latitude is allowable in regard to the cuts, as to the part of the adversary's body at which they are directed, provided the general inclination of the blow be observed; similarly, the cut may at times be parried by a guard other than that intended specially for it, according to the discretion of the fencer.

In engaging, or joining swords, with the enemy, press the blades but lightly together, so that the hand and wrist may be readily susceptible of any motion. In making the guards, care must always be taken to receive, if possible, the feeble of the enemy's blade on the forte of your own, so as to offer the greater opposition. It should also be borne in mind that, in all cuts at the leg, when at proper distance, the shifting of your own leg, and delivering a cut at the same moment, becomes the most effectual and advantageous defense, particularly if you happen to be taller than your adversary, as you will then probably be out of his reach, while he is within yours.

In contending with bayonet or pike, the most effectual guard is the 5th, which, if well timed, enables the swordsman to seize the musket or pike with his left hand, and then make the 6th cut at his opponent's neck. In an encounter with the rapier, the best cuts are Nos. 3 and 4, as they attack the enemy's arm, which must be advanced within reach before he can touch your body, and also constitute a defense against his thrust. If the enemy—no matter how armed—be on horseback, the dismounted swordsman (provided he have proper nerve and agility) has decidedly the advantage. Endeavor to place yourself on his left, where he has less power of defending himself or his horse, and cannot reach to so great a distance as on his right: an attack on the horse will probably render it ungovernable, and it becomes easy then to avoid the rider's blows, while he himself may be attacked with impunity in almost any direction.

Bayonet Exercise.—If the sword exercise be of use to volunteer officers, there are thirty times as many volunteers themselves to whom a proper command of the bayonet is indispensable. In close-quarter engagements, there is no weapon more formidable: from its length and weight, the thrust of the bayonet gives a terrible wound, and its force is such that there is great difficulty in parrying the attack. Like other small arms, it is most serviceable when handled on scientific principles; and the art of using it to advantage is so simple as to be very easily acquired, while the exercise, from the weight of the rifle, admirably aids in developing the muscles of all parts of the body.

Of course, the bayonet is always fixed at the end of the musket, when it becomes virtually a pike. The position of the feet in the bayonet exercise remains always the same relatively, and absolutely until advance or retreat be effected. The right foot is thrown back 24 in., and the weight of the body thrown upon it. The heels are kept in a line with each other, both knees bent and well apart; the right knee directly over the foot, the left easy and flexible, pointing to the front. In this position of the body, all the defensive motions of the bayonet are made. In "guard," the bayonet is brought nearly to a horizontal direction, level with the waist, and pointing towards the breast of an advancing enemy. Similarly, to "guard," the positions "low," "high," and "second point" are assumed. The butt of the rifle is always kept well to the right side, the hand behind the trigger-guard, and the whole body in attitude to offer great resistance. In "low," the barrel is turned downwards; but in all the other defensive motions it is held upwards. The position of the arms is in each case that which would naturally be taken in placing the bayonet and musket in the required direction.

The offensive position of the body is acquired by the extension of the right leg, and bending forward of the left without moving the feet. The butt of the rifle is at the same time pressed firmly to the shoulder. This position is called "point," and constitutes an extension of the weapon in a direction parallel with either of those previously taken. As there were four "guards," so there are four points. The barrel is in each case upward, and the motions for each are similar, except in pointing from "2d point,"

when the rifle, seized by the right hand round the small of the butt, is thrust straight up above the head to the full extent of the arm, the left hand falling along the thigh, and the legs being straightened so as to form an isosceles triangle.

"Shorten arms" is a useful motion, both as a defense and as a preparation for a strong attack. It consists in carrying the butt back to the full extent of the right arm, while the barrel (downwards) rests upon the thick part of the left arm. The body is thrown upon the right leg, and the left straightened.

In all the guards and points, and also "shorten arms," the bayonet may be turned directly to the front, to the right, or to the left, as circumstances may suggest. In contending with a swordsman, the action of changing from right to left, when at the "high" or "low," is sufficient defense against the ordinary cuts of the latter.

Among the treatises consulted for this article have been the works on F. by Angelo and Roland, as well as the shorter instructions issued by the military authorities.

FENELON, Francis de Salignac de la Mothe, was b. Aug. 6, 1651, in the château Fenelon, province of Perigord, now included in the department of the Dordogne, of a family which has given many celebrities both to the church and to the state in France. His education was conducted at home up to his 12th year, when he was transferred to Cahors, and afterwards to the Plessis college in Paris. At the close of a most blameless collegiate career, he selected the church as his profession, and entered, in his 20th year, the newly founded seminary of St. Sulpice, then under the direction of the celebrated abbé Tronson, where he received holy orders in 1675. Unlike but too many ecclesiastics of his own rank at that period, he gave his whole heart to his sacred calling. For some time after his ordination, he was employed in attendance at the hospitals, and in other parochial duties of the parish of St. Sulpice; and in the year 1678, he was named director of an institution recently founded for the reception of female converts to the Roman Catholic faith, in Paris. During his tenure of this office, he wrote his first work, *On the Education of Girls,* which is still a standard authority; and the gentleness, moderation, and charity with which he discharged his duties towards the young converts, led to his appointment as head of a mission, which, on the revocation of the edict of Nantes in 1685, was sent to preach among the Protestant population of Saintonge and Poitou. In 1688, he resumed his duties in the Maison des Nouvelles Converties, at Paris; and in the following year, he was named by Louis XIV. to the highly confidential post of preceptor of his grandson, the young duke of Burgundy. F.'s management of this most important and delicate trust showed how well he understood the true nature and objects of education. All his own instructions, and all the exercises enjoined upon his pupil, were so contrived, as, while they imparted the actual knowledge which it is the ordinary business of a master to communicate, at the same time served to prepare the mind and the heart of the pupil for what was to be the real business of his life, by impressing upon him a sense of the responsibility which awaited him, of the great principles of truth and justice upon which these responsibilities are founded, and of the hollowness and futility of all earthly glory, power, and happiness, which do not rest upon this foundation. To this wise design of the preceptor we are indebted for many works still popular in educational use; for the *Fables;* for the *Dialogues of the Dead;* for the *History of the Ancient Philosophers;* for the germ at least of the *Telemachus;* and for the *Life of Charlemagne;* the manuscript of which last work, unfortunately, was burned in the fire which destroyed the archiepiscopal palace of Cambray in the year 1697. As an acknowledgment of these great merits, he was presented by the king, in 1694, to the abbey of St. Valery, and in the following year, to the archbishopric of Cambray, which he only accepted on the express condition that for 9 months of each year he should be exempted from all duties as preceptor of the prince, and left at liberty to devote himself exclusively to the care of his diocese. It is to this period of F.'s life that the history of the unhappy controversy about quietism belongs. Without entering into the details of this singular revival of the ancient mysticism (see Mysticism), it will be enough to say that two separate schools of quietism are to be distinguished, the moral character, or at least the moral tendency, of which was exceedingly different. See Quietism. In one of these, the common mystic principle of the absorption of the soul in the love and contemplation of God, led to the conclusion that the soul, in this state of absorption, became entirely passive; that it was thenceforth independent of the external world; that it suffered no contamination from the material actions of the outer man, and that no acts of virtue, not even of prayer, were any longer required. See Molinos. The other school, while it maintained the theory of passive contemplation and love, yet repudiated the dangerous and immoral consequences which were deduced therefrom. It was exclusively the latter and less objectionable form of quietism, the professors of which for a time claimed, although not the patronage, yet at least the indulgent consideration of Fenelon. He formed, in the year 1687, the acquaintance of the celebrated Madame Guyon, who may be regarded as the foundress of the French school of quietism. See Guyon. The extraordinary piety and exemplary life of this remarkable woman, and his own natural bias towards the tender and lofty spirituality which she professed, appear to have blinded F. to the true nature and to the practical consequences of the system which she followed. Fully convinced of the unfairness of much of the outcry which was raised against her, and which made her responsible for all the principles of

the grosser quietism of Molinos, his generous mind was perhaps attracted to her cause by the very injustice of her opponents. He advised her to submit her works to the judgment of Bossuet, who was then in the zenith of his fame, and with whom F. was in the most friendly relations. In the condemnation of the book of Madame Guyon by this prelate, F. acquiesced; but as she made a formal submission to the church, he refused to join in any condemnation of herself personally. Nevertheless, when a commission was appointed to examine the whole affair, F., although not a member, took a part in the proceedings; and he even suggested certain changes in their report, which he subscribed in common with the rest. To the articles prescribed for her signature by this commission, Madame Guyon readily subscribed; but it was further considered necessary not only to publish a condemnation of her several works, but also to prepare a special exposition of the true doctrine of the church on these questions. When the work of Bossuet on this subject was completed, he submitted it to F. for his approval. This F. not only refused to give, but even composed his own *Maxims of the Saints in the Interior Life*, in explanation and defense of certain at least of Madame Guyon's doctrines. He submitted his book to the archbishop of Paris, and introduced into it some modifications which were suggested by the diocesan censors, cheerfully agreeing to the stipulation of the archbishop, that it should be kept back from publication until the completion of the rival treatise of Bossuet, *On the States of Prayer*. An unfortunate violation of this engagement, committed without the knowledge, and in the absence of F., was the last of a long train of causes which led to the painful and disedifying rupture between these two great prelates. F.'s book was received with much clamor, that of Bossuet was universally approved; and in the controversy which ensued, all the weight of the displeasure of the court, which F. had provoked by the covert strictures upon the existing state of things, in which he was believed to have indulged in his works of fiction, was brought to bear against him. He was ordered to submit his book to the judgment of an ecclesiastical tribunal, of which Bossuet was a member. F. refused to accept Bossuet as judge, on the ground that he had already prejudged the cause; and in the end he appealed to the judgment of the Holy See. Unfortunately, even while the affair was pending at Rome, the controversy was still maintained in France. Bossuet published a succession of pamphlets. Several of the bishops who had espoused the side of Bossuet, issued pastorals in the same sense. F. defended himself vigorously against them all in several publications, explanatory as well of his principles as of the personal imputations in which some of his adversaries did not scruple to indulge. The last blow against the ancient friendship of the great rivals was struck by Bossuet in his celebrated *Relation sur le Quiétisme*. F. was wounded to the heart. The copy of Bossuet's pamphlet which first came into his hands is still preserved in the British museum; and the margin is literally filled with remarks, annotations, replies, denials, and rejoinders, in the singularly delicate and beautiful handwriting of the indignant archbishop. The copy now in the British museum is most probably one which, as we learn from his correspondence, he sent to his agent at Rome, and on the margin of which he corrected, for the guidance of his friend, the many false and exaggerated charges of his great antagonist. The substance of these replies he gave to the public in a most masterly defense, written, printed, and published within little more than a fortnight from the appearance of Bossuet's *Relation*. From this point, the controversy assumed a more personal, and therefore a more acrimonious character; and it was maintained on both sides till the long delayed decision of the pope brought it to a close, Mar. 12, 1699, by a brief, in the usual form, condemning the *Maxims of the Saints*, and marking with especial censure 23 propositions extracted from it. The conduct of F. under this blow constitutes, in the eyes of his fellow-churchmen, one of his highest titles to glory. He not only accepted, without hesitation, the decision of Rome, but he took the very earliest occasion to publish from his own pulpit the brief of his condemnation; he issued a pastoral address to his flock, to apprise them of the judgment of Rome, and of his own cheerful acquiescence; and he presented to his cathedral a magnificent piece of church-plate, a gold ostensory, in which the angel of truth is represented trampling under foot many erroneous works, the most prominent of which bears the title of *Maxims of the Saints!* Bossuet is said to have been greatly touched by the conduct of his noble adversary, and to have earnestly desired a reconciliation. But the adverse influence of the king, Louis XIV., and of the court stood in the way. The jealousy with which the political principles of F. were already regarded was heightened about this time into open hostility by the appearance of his *Telemachus*, which was printed from a copy surreptitiously obtained by his servant, and which the king regarded as but a masked satire upon his own court: Sesostris being supposed to represent the Grand Monarque himself; Calypso, Madame de Montespan; Protesilaus, Louvois; and Eucharis, Mademoiselle de Fontanges. Louis's anger knew no bounds. F. was strictly restrained within his diocese; measures were taken to give the condemnation of his book every character of publicity; and what wounded him most of all, all intercourse with him, whether personal or by letter, was forbidden to his old and much-loved pupil, the duke of Burgundy. From this date, F. lived exclusively for his flock. He founded at Cambray a seminary for his archdiocese, which he made his own especial charge. He was assiduous in preaching, and in the discharge of the other duties of his office; and the fame of his benevolence, charity, and enlightened liberality is attested

by the order given in the campaign of 1709 to spare the palace and the stores of the archbishop of Cambray. The only later controversy in which he appears is the revival of the Jansenistic dispute in the well-known form of "The Case of Conscience" (see JANSEN), in which F. engaged earnestly on the side of orthodoxy. Notwithstanding the prohibition of his grandfather, the young duke of Burgundy retained all his old affection for his preceptor; and the highest hopes were entertained as to the future career of the pupil of such a school. These hopes were unfortunately cut short by the premature death of the duke in 1712. F. survived him but a short time. He died Jan. 7, 1715.

The works of F. are very voluminous. The latest collected edition extends to twenty 8vo volumes, and embraces every variety of subjects—theology, philosophy, history, literature, ancient and modern, oratory, especially the eloquence of the pulpit, asceticism, and spirituality in all its branches. His correspondence is very extensive and most interesting. Of his early sermons (one of which was delivered in his 15th year), a volume was printed in 1744. Of his mature discourses, two only have reached us in a finished state. They are of the very highest order of sacred eloquence. Of the rest, we can only judge from the skeletons which it was his habit to prepare with great exactness, and of which very many have been preserved. His literary and historical works, many of which were composed for the instruction of his pupil, are filled with allusions and suggestions illustrative of the principles of government and of the relative duties of sovereigns and subjects, far in advance of the time in which he lived. His work on the *Temporal Power of the Mediæval Popes* presents that doctrine in a form which divests it of many of those characteristics which are most objectionable in the eyes of Protestants; and even his spiritual writings in general may be read, and indeed are not unfrequently read, not only without offense, but even with positive advantage, by Christians of all denominations. See card. Bausset's *Histoire de Fenelon* (3 vols., 1808–9); also the *Vie de Bossuet* of the same author. See also the life prefixed to the collected edition of the *Œuvres de Fenelon;* the voluminous correspondence contained in that collection; *Vie de Fenelon*, by M. Gosselin; Wunderlich's *F.* (1873); and Hunnius, *Das Leben F.'s* (1873).

FÉNELON, FRANÇOIS DE SALIGNAC DE LA MOTHE, 1641–79; half-brother of the great archbishop. He was a missionary in Canada, and founded, among the Cayuga Indians who had left New York and settled on the bay of Quinté, an establishment for the education and protection of Indian children. He had a disagreement with Frontenac, the governor of Canada, and was sent back to France.

FENESTELLA, or FENESTRELLA, a genus of polyzoa, resembling the recent "lace coral," very common in paleozoic rocks, from the lower Silurian to the Permian. Thirty species have been described.

FE'NIAN SOCIETY, a political association of Irish or Irish-Americans, the object of which is the overthrow of the English authority in Ireland, and the establishment of a republic. The etymology of the name has been the subject of some discussion. It is traced to the ancient Irish military organization called Fionna Eirinn, which took its appellation from the celebrated hero of Irish legend, Finn (or Fionn) MacCumhail. The accounts of this renowned body, with which the bardic literature of Ireland abounds, are most curious. It was designed as a national militia, and its origin is ascribed, by Keating, to Sedna II., who was monarch of Ireland about 400 years B.C. In time of peace it consisted of three bodies, each formed on the model of a Roman legion, and consisting of 3,000 men; but in war, it was capable of being enlarged to any required limit. Candidates for enrollment were required to be of an honorable family, to be irreproachable in morals, and to bind themselves to observe the laws of justice and morality; they were required to be of a certain height, and strong, supple, and vigorous of body; each being submitted, before enrollment, to an ordeal, in which his powers of speed, strength, endurance, and courage were tested by trial with his future comrades. The bardic accounts of some of those conditions are extravagant and amusing in the highest degree, but the generally historical character of the institution is unquestionable; and it subsisted until the reign of Carbry, son of Cormac MacArt, by whom the body of Fionna Eirinn was disbanded, and the members having, in consequence, transferred their allegiance to Mocorb, king of Munster, suffered an almost total extermination in the battle of Gavra, 284 A.D., which formed the theme of many a bardic poem from the days of Oisin (known in Gaelic legend as Ossian), son of Finn MacCumhail, downwards.

Adopting the name of this ancient military association, the modern Fenians (or Finians) are a secret association for the purpose of overthrowing the alien ascendency of the Saxon, and of restoring to the ancient Celtic population their legitimate status and influence in their native country. It had its first seat in America, where the Irish population has largely increased since the famine of 1846–47. Many of the emigrants being driven from their homes by arbitrary ejectment, or from inability to pay rent, carried with them a sense of fancied wrong, which prepared them for almost any enterprise which seemed to promise revenge. Others had been sympathizers, if not participators in the insurrection of 1848; and almost all were deeply imbued with general political and social discontent. By all these, the prospect of a secret organization for

the establishment of Irish independence was eagerly accepted. The most openly active seat of the organization was in the western states, especially Chicago; but the movement was directed from New York, and possessed ramifications in almost every city of the union. It was conducted by a senate, and consisted of "circles," each directed by a center. The duty of the centers was to enrol members, who bound themselves, generally by oath, "to be faithful to the Irish republic as at present virtually established;" to instruct and practice them in military exercises; to raise funds for the purposes of the association, especially for the purchase of arms and munitions of war; and to extend the organization by every means at their disposal. Agents were sent into Ireland; and to the chief seats of the Irish population in England; and while the work of secret enrollment was industriously carried on in Ireland, measures were openly concerted in America, as well for the raising of funds by private contributions, as for the purchase of arms and military stores. Opportunely, too, for the purposes of the enterprise, the termination of the civil war in America set free a large number of military adventurers who had served as privates or as officers in one or other of the American armies, and whose experience of service was turned secretly but most actively to account in the training of the young recruits enrolled in the Fenian conspiracy in Ireland. Newspapers, moreover, both in America and in Ireland, were established or subsidized for the purposes of the conspiracy; and journals, broadsides, ballads, and other inflammatory publications were largely circulated among the peasantry and artisans. Taverns, alehouses, and other places of entertainment were the ordinary places of meeting; and one of the most formidable of the plans of the conspiracy was an organized attempt to seduce the Irish soldiers from their allegiance, and to prepare the way for their deserting to the ranks of Fenianism, when it should have reached the expected degree of maturity. It became apparent, moreover, that in this, unlike almost all similar movements, pains were taken by the organizers to exclude the Catholic clergy, by whom the Fenian confederation had from the first been steadily resisted, from all knowledge of its character and objects, as well as of the names or number of its members in the several localities; and many of the most active of the leaders were distinguished by the freedom of their religious opinions, and by their unconcealed disregard of clerical authority.

For a time, these designs were carefully concealed, and even when a certain publicity was given to them, the scheme appeared so wild and impracticable that it was regarded as an attempt, on the part of a body of unprincipled adventurers, to practice upon the patriotic susceptibilities of the ignorant and excitable Irish, especially in America. By degrees, however, the movement acquired more solidity, and the government ascertained by reliable information that Fenianism, however corrupt in some of its sources, and however wild and extravagant in its aims, was nevertheless a reality with which it had become necessary to grapple. Measures were taken with great promptness and determination. The habeas corpus act having been summarily suspended, all the known leaders in Dublin and in the provincial districts of Ireland (most of them Irish-Americans) were at once placed under arrest. The chief journal of the conspiracy was suppressed and seized; additional troops were moved into Ireland, and other measures of repression were vigorously carried out. By these energetic measures, public tranquillity was maintained in Ireland; and although prosecutions were instituted, and a few individual conspirators convicted, so universally was the movement condemned by the public opinion of the country, that most of the prisoners were discharged, on condition of their leaving Ireland. But although thus in appearance extinguished, the embers of discontent continued to smolder among the poorer peasantry and the working population of the towns; and a certain prestige was given to the fallen cause by the escape from prison, under circumstances of much mystery and a high degree of romance, of the most active and crafty of the leaders of the conspiracy. His return and that of other exiles to America renewed the agitation in that country. In the early summer of 1866, a raid was attempted into Canada, and although it proved so utter a failure as to cover its projectors with ridicule, an organization was secretly pursued, both in America and in Ireland, which resulted, in the spring of 1867, in an insane and utterly abortive attempt at insurrection at home. The plan of the conspirators was to seize the castle and military stores at Chester, and, having cut off telegraphic communication, to convey these arms to Dublin, and effect, throughout the country, a simultaneous rising in concert with the enterprise at Chester. The attempt was defeated through the treachery of one of the conspirators, by whom the plot was revealed. A partial insurrection, however, took place concurrently with the attack on Chester, in the county of Kerry; and a few weeks later, a more extensive movement was attempted in the counties of Dublin, Louth, Tipperary, Limerick, and Cork. But the persons engaged in it were for the most part either American and Irish-American adventurers, or artisans, day-laborers, and mechanics, generally unprovided with arms, and in many cases scarcely beyond the years of boyhood. The only military enterprises undertaken by them consisted in a series of attacks on the barracks of the rural constabulary, in almost every instance unsuccessful; most of the parties dispersed or were made prisoners after a single night's campaign. The rest betook themselves to the mountains, and after a few days of exposure and hardship, in which they managed to evade pursuit, and carefully avoided all encounter with the military, they were either captured or dispersed. The leaders were tried at a special commission held within the spring of the year 1867, and

tranquillity for a time seemed to be restored in Ireland. Much discontent, however, still continued to exist; and as the foreign organization was uncontrolled, and was still maintained, it remained as a standing element of danger, and a persisting incentive to domestic disaffection. Considerable alarm was created in England and Scotland by the extent and daring of the organization among the Irish population of the large manufacturing towns. In Sept., 1867, an attack was made, in open day, on a police-van in Manchester; the officer in charge was killed, and the prisoners, who were suspected Fenians, were released. A few weeks later, a still more daring attempt was made to blow down Clerkenwell prison wall, with the same object. Alarms were circulated of intended burnings in the cities and towns; gunsmiths' shops and even government stores of fire-arms were broken open and pillaged; and a vague but wide-spread feeling of apprehension was for a time created. Much of this, however, has been removed by the better spirit produced by recent legislation in Ireland, as well as by the marked improvement in the condition of the smaller tenant-farmers, and the scale of wages of agricultural and other laborers. Agrarian outrages have notably decreased in number. The prisoners confined for political offenses have all been released, with the exception of those who had been soldiers, whose detention is a standing grievance. The settlement of the Alabama claim is supposed to have taken out of the hands of the American Fenians one of the most powerful instruments of agitation among the Irish population in America. Since the collapse of Fenianism, Irish grievances have been represented in a corporate form by the *home government association*, a more peaceable body than the Fenians. See HOME RULE.

FENNEC, or ZERDA, *Megalotis*, a genus of *canidæ*, peculiar to Africa, resembling foxes in general form and in the bushy tail, but having eyes adapted for diurnal and not for nocturnal vision, and remarkably large ears. The species are small and beautiful. They feed partly on dates and other vegetable food, also on eggs, and on insects, which they adroitly snap as they pass.

FENNEL, *Fœniculum*, a genus of umbelliferous plants, allied to dill (q.v.), but distinguished by the cylindrical strongly ribbed fruit. The flowers are yellow. All the species are aromatic, and have much divided leaves with thread-like segments. The best known is the COMMON F. (*F. vulgare*), a native of the s. of Europe and of some parts of England. It is a biennial, 3 or 4 ft. high, and is cultivated in gardens, chiefly for the sake of its leaves, which are boiled, and served up with mackerel, with salmon, and occasionally with other kinds of fish, or are employed to form a sauce for them.—SWEET F., ITALIAN F., or CRETAN F. (*F. dulce*), is a plant of much humbler growth, and annual, much cultivated in the s. of Europe, but too tender for the climate of Britain. The young sprouts from the root are sweeter and less aromatic than those of common F., and when blanched, are a very agreeable salad and potherb. The fruit (seed) is longer and paler than that of common F., has a more agreeable odor and flavor, is the favorite aromatic condiment of the Italians, and is used in medicine as a carminative and aromatic stimulant. *Oil of F.*, an aromatic, stimulant, and carminative essential oil, is also made from it.—CAPE F. (*F. capense*), found in the interior of the cape of Good Hope, has a thick, aromatic, esculent root.—The PANMUHOOREE of India (*F. panmorium*) is a species of F. much cultivated in its native country for its sweet, warm, and aromatic fruit, which is much used as a carminative, and in curries.—The GIANT F. of the s. of Europe is a plant of a different genus (*ferula*), and abounds in a fetid juice. It is indeed closely allied to asafetida, but forms a favorite food of buffaloes in Apulia, where it particularly abounds. The dry dead stem is full of a white pith, which is used in Sicily as tinder.

FENRIR, in Norse mythology, the offspring of Loki (the evil genius) and Angurboda (anguish-boding), a giantess from Jötunheim. Loki had a legitimate wife, Sigyn; but with Angurboda he became the father of three monsters: 1. The wolf Fenrir; 2, the Midgard Serpent; 3, the Goddess of Death, whose name is Hell (the English word "hell" is of similar derivation). The wolf Fenrir was bred among the gods, but only Tyr had the courage to give him food. When the gods saw how much he increased daily, and remembered that the predictions were that he was destined to be their destruction, they endeavored to chain him. But he easily broke the first two chains. Then they made a third. It was composed of the sound of a cat's footsteps, a woman's beard, the roots of a mountain, a fish's breath, and a bird's spittle. Fenrir suspected some trick in this, and he said: "If ye bind me so fast that I cannot free myself again, I am well convinced that I shall wait long to be released by you. I am, therefore, not at all desirous to let the cord be fastened upon me. But rather than that ye shall accuse me of want of courage, let one of you place his hand in my mouth as a pledge that there be no guile in the case." The gods hesitated, but finally Tyr put his hand in the wolf's mouth, and the wolf in his vain struggles to break the chain bit off the hand. Fenrir could not break the magic chain, and became a captive to the gods until Ragnröck—the end of time—comes. Fenrir will then break loose, his upper jaw will touch heaven, his nether jaw the earth; fire will blaze from his eyes and nostrils. In the tremendous tumult which precedes the general dissolution, the wolf will swallow Odin (father of gods), and so cause his death. But at the moment will come Vidar, the silent god, who wears a wonderful shoe made from shoe-parings since time began.

With that shoe he will hold down Fenrir's lower jaw, and with his hands tear off the upper jaw, and thus will the monster wolf be slain.

FENS. See BEDFORD LEVEL.

FENTON, a village in Genesee co., Mich., on the Detroit and Milwaukee railroad, 52 m. n.w. of Detroit; pop. '70, 2,353. Water power is furnished by Shiawassee river, and there are a number of manufactories. There are also a Baptist seminary and an Episcopal high school.

FENTON, ELIJAH, 1683–1730; an English poet, master of a free grammar school in Kent. He was tutor to the only son of the earl of Orrery, and on the poet Pope's recommendation gave private literary instructions to Mr. Craggs, secretary of state. He assisted Pope in translating *The Odyssey*. In 1717, Fenton published *Miscellaneous Poems*, and in 1723 appeared *Marianne*, a tragedy. He superintended a new edition of Milton's poems, and also an edition of those of Waller. The epitaph on his tomb was written by Pope.

FENTON, REUBEN E., b. in w. N. Y., 1819. He studied in the local academies, went into law, and was admitted to the bar, but soon afterwards became a merchant. He was representative in congress from 1857 to 1865. In 1864, he was elected governor of the state, and re-elected in 1866, serving in all four years. In 1869, he succeeded ex-gov. Morgan as U. S. senator, serving for six years.

FENTRESS, a co. in n. Tenn., on the Kentucky border, drained by the head waters of the Cumberland river; 525 sq.m.; pop. '70, 4,717—170 colored. The surface is rough, and for the greater part covered with timber. Corn, cattle, and hogs are the staple products. Bituminous coal is found. Co. seat, Jamestown.

FENUGREEK, *Trigonella*, a genus of plants of the natural order *papilionaceæ*, sub-order *leguminosæ*, allied to clover and melilot. The leaves have three obovate leaflets and scythe-shaped stipules. The flowers generally have the *keel* very small, so that the *wings* and *standard* present the appearance of a tripetalous corolla. The COMMON F. (*T. fœnum Græcum*) is a native of the s. of Europe, and of some parts of Asia; it is much cultivated in India as a fodder-plant, and derives its name (*fœnum Græcum*, Greek hay) from its use as fodder in Greece. Its pods are many-seeded, and cylindrical; its seeds have a strong peculiar smell, and an oily bitter taste; the flour made from them is used for emollient poultices, but only in veterinary practice. The seeds of F. were formerly held in great esteem in medicine.—Another species (*T. incisum*), growing spontaneously in many parts of India, is much used as fodder for cattle. The legumes of the ESCULENT TRIGONELLA (*T. esculenta*), also an Indian plant, are used as human food. One species only, the BIRD'S FOOT F. (*T. ornithopodioides*), is a native of Britain, a small plant, growing in sandy pastures near the sea, and not very common.

FENWICK, GEORGE, d. 1657; an English emigrant who settled near Saybrook, Conn., in 1636. He was governor of the colony, with a short interval of absence in England, until Dec., 1644, when he sold his plantation to the Connecticut colony, and returned to England, where he became a col. in the parliamentary army, and was one of the judges on the trial of Charles I.

FENWICK, JOHN, 1618–83; an English Quaker, founder of a colony at Salem, in New Jersey, in 1675. His rights were contested by sir Edmund Andros, governor of New York, and he transferred his claims to William Penn.

FENYES, ELEK (Alexius), a Hungarian geographer and statistical author, was b. in 1807, at Csokaj, in the co. of Bihar. After the usual career of studies in philosophy and law, F. became barrister-at-law as early as 1829; but instead of frequenting the law-courts, he began traveling all over the country, with the purpose of making himself thoroughly acquainted with the state of the Hungarian kingdom, of which there had never before been an authentic survey. The first fruits of F.'s enterprise appeared in 1840, under the title, *Hungary and its Annexed Parts, Geographically and Statistically considered* (6 vols., Pesth). The great prize of 200 ducats was awarded to the author by the Hungarian academy. *The Statistics of Hungary*, in 3 vols., followed (1843); *General Atlas for Hungary* (1845); *Description of Hungary* (1847); *Geographical Dictionary of Hungary* (1851)—all of which were published at Pesth. The whole of F.'s works are written in the Magyar tongue, but several of them have been translated into German, and repeatedly published. Besides that these works are the first true expounders of the state of Hungary, it is also generally admitted that, as to their completeness, solidity, and exactness, they will bear a comparison with the best of kindred works in European literature. During the national government of Hungary (1848), F. was made the chief of the statistical section. After a respite of several years, from failing health, F. again busily engaged for a time in the periodical press as editor of an agricultural paper, but soon retired finally into private life.

FEODO'SIA, or THEODOSIA. See KAFFA.

FEOFF'MENT (*infeudare*), the oldest, and for a long period the only, method for the conveyance of land known in England. F. consisted in the formal conveyance of the land from the feoffor to the feoffee, the former stating distinctly the measure of the estate conferred, whether it was in fee, in tail, or for life. Where no mention of the

duration of the estate was made, the gift was presumed to be for life. This conveyance of the land, in order to be complete; required to be accompanied by delivery of sasine (q.v.). Livery of sasine was of two kinds—viz., by deed, and in law. In the former case, the parties being actually upon the land, the feoffor, by delivery of a twig or a turf, testified his conveyance of the land. In livery in law, the parties being in sight of the land, the feoffor referring to the land gave possession to the feoffee. This mode of F. was ineffectual unless the feoffee entered into possession during the life of the feoffor. Livery in deed might be effected by attorney; but livery in law only by the parties themselves. In the earliest times, these ceremonies completed the conveyance. But by degrees the practice of embodying the transaction in a deed was introduced. When a deed was used, it became customary, but not essential, to indorse on the deed the fact that livery of sasine had been made. By the statute of frauds (29 Car. II. c. 3), it was declared that no estate created by livery of sasine, unless accompanied by writing, signed by the party or his agent, should be of any effect, except as an estate at will; and by 8 and 9 Vict. c. 106, s. 3, a feoffment is void unless accompanied by deed. The law formerly gave so great an effect to a feoffment, that even when the party ostensibly making the conveyance was not lawfully seized in the estate, the feoffment was sustained. This was called a tortious conveyance; the party in whose favor it was made was said to have acquired an estate by wrong, the rightful owner was disseised, and was left to his right of entry (q.v.). But by the act last mentioned, this tortious effect of a feoffment was removed. It must be observed that the practice of feoffment above described, and which has existed in England from time immemorial, differed materially from the old form of investiture in use in strictly feudal times, and from that which still prevails in Scotland. In England, the transaction was simply a conveyance by the actual holder of the land to a new tenant, testified by certain ceremonies, but requiring no confirmation by a third party to complete it. But by feudal usages, every holder of land was the vassal of some superior lord, to whom he owed suit and service, and without whose consent he could not even part with his land; hence no conveyance was complete without the reception of a new tenant by the lord paramount as his vassal. In like manner, to this day, in Scotland, no transfer of heritage is complete without the formal confirmation of the superior; and although by recent legislation the old feudal usages, which for two centuries have existed as landmarks, telling us of a system now passed away, have been abolished, yet the fact of acceptance by the superior, and the performance of the pecuniary services attendant on that acceptance, are still preserved. See INFEFTMENT, SASINE, FEUDAL SYSTEM.

Feoffment to Uses.—This was an application of the feudal form of *feoffment* in England in order to effect a conveyance in trust. The common law courts, adhering to feudal rules, refused to recognize any interest in the land but that of the person actually infeft; but where a F. was made to one man *to the use* of another, the equity courts gave effect to the transaction by compelling the party infeft to hold in trust for the third person, called the *cestui que use*, who was said to have an equitable estate, in contradistinction to the legal estate which remained in the feoffee to uses. By the statute of uses, it was enacted that in all such conveyances the actual legal estate should pass to the *cestui que use*. See USES.

FER DE LANCE, *Craspedocephalus lanceolatus*, a venemous serpent of South America and the West Indies. It is very prolific; grows to a length of 5 or 6 ft.; gives no warning of attack, and its bite is often fatal. Those who recover through the application of counter-irritants are usually affected for years with paralysis or diseases of the blood.

FE'RÆ (Lat. *ferus*, wild), in the Linnæan system of zoology, an order of *mammalia*, nearly corresponding to the *carnaria* (q.v.) of Cuvier.

FE'RÆ NATU'RÆ (Lat. of a wild nature). Those animals which flee the dominion of man, whether beast, bird, or fish, and retain their natural freedom, are thus characterized in the Roman law. According to that system, such animals became the property of any one who might catch them, irrespectively of the ownership of the soil on which they were taken, on the principle that "natural reason gives to the first occupant that which has no owner."—*Inst.* ii. tit. i. s. 12. But this regulation did not prevent the prohibition of trespass. "Of course, any one who enters the ground of another for the purpose of hunting or fowling, may be prohibited by the proprietor, if he perceives his intention of entering" (*Ib.*). This right on the part of the proprietor did not affect the property of the animal taken, though it gave him an action against the trespasser. If a wild animal escaped from its captor, his proprietorship instantly ceased, and the animal might again be appropriated by its captor. This occurred even though the animal was not out of sight, if it could not be pursued without great difficulty. Even a wounded animal was not the property of the sportsman till it was caught, though the point which is decided in this sense (*Inst.* ii. tit. i. s. 13) is said to have been one on which difference of opinion had prevailed. Except in so far as it is modified by the statutes, which will be explained under GAME-LAWS, these provisions form part of the common law both of England and Scotland. Animals which are said to be F. N., or of a wild and untamable disposition, any man may seize upon and keep for his own use or pleasure; but if they escape from his custody, though without his voluntary abandonment, it naturally

follows that they return to the common stock, and any man else has an equal right to seize and enjoy them afterwards (Stephen's *Blackstone*, i. 161). The law of Scotland followed the law of Rome so closely in this, as in other respects, that the passage from the *Institutes* of Justinian above referred to was translated into one of the oldest collections of Scottish laws—that, viz., contained in the Cromortie MS., the date of which may be assigned to the latter part of the 14th c., and which certainly is not later than the reign of Robert III. (Irvine's *Game-laws*, p. 20, and statutes published by the record commission, appendix v. p. 385); see also Stair, ii. 1, 5, and 33; and Ersk. ii. 1, 10. Under animals, F. N., the law of Rome included *bees*, unless included in a hive, or *skep*, as it is still called in Scotland, or unless the proprietor be in pursuit of them, and has kept them in sight. See BEE. Domestic animals, though they stray, do not cease to be the property of those to whom they have belonged; but as regards animals which have a tendency to return to a state of nature, the rule of the Roman law was, that property in them continued so long as they had the intention of returning (*animum revertendi*), or rather, one would imagine, the habit of doing so. This rule applied to peacocks and pigeons, but not to fowls and geese; with reference to which it was provided, that though they should be frightened and take to flight, they were still yours, though you might have lost sight of them, and that whoever detained them with a view to his own profit, was guilty of theft. See DOVECOT, WARREN, FOREST LAWS; FISHES, ROYAL.

FERDINAND I., emperor of Austria (1835–48), eldest son of Francis I. by his second marriage with Maria Theresa of the house of Naples, was b. at Vienna, 19th April, 1793. He was from the first of a weak constitution, and was unfortunate in those to whom his education was intrusted. Yet he showed on all occasions a goodness of heart, which was fostered by the example of his uncle, the archduke Charles, to whom he was much attached. While crown-prince, he traveled through his Italian provinces, Switzerland, and part of France, and took great interest in manufacturing industry. In 1835, he succeeded his father on the throne. It was expected from his character that he would inaugurate a more liberal policy than his predecessors had pursued, but the absolutist principles that seem destined to rule forever the Austrian cabinet, triumphed, and Metternich was allowed to carry on the government. It now became obvious that F. sadly lacked moral decision, and his "goodness" exhausted itself in numerous acts of clemency and benevolence. Nevertheless, during his reign, the industry of Austria made a great advance, and the great net-work of railroads and highways was begun. The insurrection in Galicia, 1846, led to the annexation of Cracow to Austria. No country was more affected by the European movement that began in the winter of 1847–48 than Austria, though the revolutionary storms that shook the empire cannot be attributed to any want of good-will to his people on the part of F., but only to a complete want of political wisdom. On the disturbances breaking out in Mar., he consented to the dismissal of Metternich, the appointment of a responsible ministry, and granted the outlines of a constitution. In May, he retired with his court to Innspruck, but was induced to return to the capital in Aug. At last, the Oct. insurrection in Vienna made him again leave the palace of Schönbrunn, and retire to Olmütz, where, on 2d Dec., 1848, he abdicated in favor of his nephew, Franz Joseph. He afterwards resided at Prague, where he died, June 29, 1875. He married, 27th Feb., 1831, Caroline, daughter of Victor Emmanuel I., king of Sardinia, but had no children.

FERDINAND I., 1379–1416, of Aragon and Sicily, surnamed THE JUST, was the younger son of John I. of Castile and Leonora of Aragon. On the death of his elder brother Henry III. in 1406, he refused the crown of Castile which the nobles had offered, but in accordance with his brother's will undertook the office of regent during the minority of his nephew John II. In this capacity he distinguished himself by his prudent administration of home affairs, and by his victories over the Moors by land and sea. He took the title *de Antequera* on the surrender of that fortress after a siege of five months, 1410. On the death of his maternal uncle, king Martin of Aragon and Sicily, his claims to the throne, though not derived through the usual laws of descent, were taken up and keenly pressed by a powerful party in the state. The question of the succession was ultimately referred to a committee of nine judges equally representing Catalonia, Valencia, and Aragon; and the result was his election by a majority in 1412. After he had defeated, at Balaguer, count Jayme of Urgel, the last and most formidable of his rivals, he was formally crowned at Saragossa in 1414. From the year 1378, Europe had been scandalized by the spectacle of the papal schism; and since 1410, three rival popes had been claiming the obedience of the faithful. At the council of Constance in 1414, Ferdinand of Aragon was a prominent supporter of the Spaniard, Benedict XIII. (Peter de Luna), who had been deposed at Pisa in 1408. The deposition of John XXIII., and the abdication of Gregory XII. in 1415, having opened the way for peace, Ferdinand consented to be present at the meeting of Sigismund with the ambassadors of France, Castile, and Navarre, in Perpignan; and after long temporizing he ultimately agreed, for the sake of the unity of the church, to withdraw his obedience from Luna. He died in the following year at Ygualada, and was succeeded by his son Alphonso V., the conqueror of Naples. [From *Ency. Brit.*, 9th ed.]

FERDINAND II., King of Aragon and Sicily. See Ferdinand V. (THE CATHOLIC) OF CASTILE, *ante*.

FERDINAND I., Emperor of Germany, 1556–64, was b. in Spain, 1503. He was the son of Philip I., and brother of Charles V., whom he succeeded in the empire in 1556, having been previously elected king of Rome. F. had married, in 1521, Anna, daughter of Ladislaus VI., king of Bohemia and Hungary. When her brother Louis fell in 1526 in battle with the Turks, leaving no issue, the crown was claimed by F. in right of his wife. This involved him in a long and bloody struggle with a rival, John of Zapolya, who laid claim to Hungary, and who, as well as his son Sigismund, was supported by Soliman, sultan of the Turks. F. at last gained the upper hand, bought off the Turks by a yearly tribute, and finally secured Hungary and Bohemia to the house of Austria. When he was elected emperor, the concessions he had made to the Protestants caused the pope, Paul IV., to refuse to acknowledge him. That pope dying, his successor, Pius IV., was more complaisant; but the electors resolved that for the future the consent of the pope should not be asked; and this was carried out. F. made several attempts to reconcile the Protestants and Catholics, and urged, though fruitlessly, the reformation of abuses on the council of Trent. He died in 1564, leaving the reputation of a prudent and enlightened ruler, and was succeeded by his son, Maximilian II.

FERDINAND II., Emperor of Germany, 1619–37, was b. at Gratz, 9th July, 1578. He was grandson of Ferdinand I., his father being Charles, archduke of Styria, the younger brother of Maximilian. F.'s mother, Maria of Bavaria, early inspired him with hatred against the Protestants. He was educated by the Jesuits at Ingolstadt, along with Maximilian of Bavaria; and at Loretto he had taken a solemn oath, before the altar of the Mother of God, to reinstate Catholicism as the sole religion of his dominions, at any cost. As soon as he succeeded to the government of his own duchy of Styria, he set about putting down Protestantism by force. He attempted the same in Bohemia and Hungary, of which countries he had been elected king during the lifetime of Matthias Corvinus; but though at first unsuccessful, and even in danger of losing his dominions, he ultimately managed, with the aid of the Catholic league and of the elector George I. of Saxony, to subdue them. Bohemia lost all its privileges. By hanging, confiscation of property, and the banishment of innumerable families, the wretched land was reduced to obedience; and the introduction of the Jesuits, and rigorous persecution of Protestants, re-established Catholicism. Meanwhile, F. had been elected emperor of Germany (1619). The war, which properly ended with the subjugation of Bohemia, was at the same time transferred to the rest of Germany, and took the character of a religious war—the famous "thirty years' war" (q.v.). The two imperial generals, Tilly and Wallenstein, were opposed by a confederacy of the Protestant states of Lower Saxony, with Christian IV. of Denmark at their head; but the confederates were defeated by Tilly at the battle of Lutter, in Brunswick, and forced to conclude peace (Lübeck, 1629). Confident in the ascendency which he had acquired, F., in the same year, issued an edict of restitution for the whole of Germany, taking away from the Protestants nearly all the rights they had acquired by a century of struggles; and the troops of Wallenstein and of the league were immediately set to work to carry it out in several places. But further proceedings were soon arrested by the dismissal of Wallenstein, on which the diet of the empire at Regensburg had insisted; and by the opposition of Richelieu, who put every wheel in movement to curb the power of the house of Austria. At this time also a formidable opponent to the schemes of the emperor appeared in the person of Gustavus Adolphus of Sweden (q.v.). After the murder of Wallenstein, the connivance at which is an ineffaceable blot on F.'s memory, the imperial commander, Gallas, gained, 1634, the battle of Nordlingen, which had the effect of detaching Saxony from the Swedish alliance; but the ability of the Swedish generals, for whom Austria had none that were a match, and the open part that France now took in the contest, brought back the balance of victory so far to the Protestant arms, that when F. died, Feb. 15, 1637, he had given up the hope of ever attaining his objects. His reign is one of the most disastrous in history; for Germany owes him nothing but bloodshed, and misery, and desolation.

FERDINAND III., Emperor of Germany, 1637–57, the son of Ferdinand II., was b. 11th July, 1608. He was not so much under Jesuitical and Spanish influence as his father. Having accompanied the armies in their campaigns after the death of Wallenstein, he had witnessed the miseries of war, and was inclined for peace; but the conflicting interests of the individual belligerents hindered any unity of view, and made it necessary to proceed with the contest. Thus was this miserable war protracted, ever extending in circuit and increasing in devastation owing to the growing licentiousness of the soldiery. At last, in 1643, a congress met at Münster to arrange terms of peace, which was concluded in 1648, and is known as the peace of Westphalia. At the diet of the empire, 1653–54, the last presided over by an emperor in person, F. effected important alterations in the administration of justice. He died, 2d April, 1657, shortly after concluding an alliance with Poland against Sweden. His son Leopold I., succeeded him in the German empire.

FERDINAND I., 1423–94; King of Naples; illegitimate son of Alphonso V. of Aragon and I. of Naples. He succeeded his father on the throne of Naples in 1458, but the pope favored John of Anjou. The latter invaded the kingdom and defeated Ferdinand, who fled to his capital. But the succeeding pope favored him,

and with the assistance of Scanderbeg, the famous Albanian chief, John was defeated with great loss, Aug. 18, 1462. In 1480, the Turks captured Otranto and murdered most of the inhabitants, but in the next year they were driven out and the place recaptured. In 1485, a number of nobles revolted. Ferdinand promised a general amnesty if they would make submission, and then treacherously murdered them. He died just as Charles VIII. of France was about to invade his dominions. His reign favored the advance of his people in knowledge and prosperity.

FERDINAND II., King of Naples, 1468–96; grandson of Ferdinand I., and son of Alphonso II., who abdicated the throne of Naples in the son's favor in 1495. The kingdom was invaded by Charles VIII. of France, and Ferdinand fled. When the French left Naples he was recalled, and, with the aid of Gonsalvo de Cordova, the great general of Ferdinand V. of Spain, he drove out the French invaders a short time before his death.

FERDINAND III., King of Naples. See FERDINAND V. (THE CATHOLIC) OF CASTILE, *ante*.

FERDINAND I., 1345–83; King of Portugal, styled EL GENTIL (the Gentleman), son of Pedro I. (not Pedro the cruel). He succeeded his father in 1367. On the death of Pedro of Castile in 1369, Ferdinand, as great-grandson of Sancho IV. by the female line, claimed the vacant throne, against the kings of Aragon and Navarre, and afterwards against the duke of Lancaster (married in 1370 to Constance, the eldest daughter of Pedro). Meanwhile, the crown had been actually assumed by Henry of Trastamara, the brother (illegitimate) and conqueror of Pedro. After one or two indecisive campaigns, all parties were ready to accept the mediation of pope Gregory XI. The conditions of the treaty, ratified in 1371, included a marriage between Ferdinand and Leonora of Castile. But, before the union could take place, the former had suddenly become passionately attached to Leonora Tellez, the wife of one of his own courtiers, and having procured a dissolution of her former marriage, he lost no time in making her his queen. This strange conduct, although it raised a serious insurrection in Portugal, did not at once result in a war with Henry; but the outward concord was soon disturbed by the intrigues of the duke of Lancaster, who prevailed on Ferdinand to enter into a secret treaty for the expulsion of Henry from his throne. The war which followed was unsuccessful; and peace was made in 1373. On the death of Henry in 1379, the duke of Lancaster once more put forward his claims, and again found an ally in Portugal; but, according to the continental annalists, the English proved as offensive to their companions in arms as to their enemies in the field; and Ferdinand made a peace for himself at Badajoz in 1382, it being stipulated that Beatrix, the heiress of Ferdinand, should marry king John of Castile, and thus secure the ultimate union of the crowns. On the death of Ferdinand at Lisbon in the following year, leaving no male issue, the direct Burgundian line, which had been in possession of the throne since the days of count Henry (about 1112), became extinct. The stipulations of the treaty of Badajoz were set aside, and John, grand-master of the order of Aviz, Ferdinand's illegitimate brother, was proclaimed. This led to a war which lasted for several years. [From *Ency. Brit.*, 9th ed.]

FERDINAND (AUGUSTUS FRANCIS ANTHONY), b. 1816; titular king of Portugal, duke of Saxony, field marshal-general; married, 1836, to Donna Maria II. da-Gloria Jeanne-Charlotte-Léopoldine-de-Cruz-Françoise-Xaviere-de-Paule-Isidore-Michaëla-Gabrielle-Raphaëla-Louise-Gonzague, queen of Portugal. He received the title in 1837, and after the death of the queen he acted as regent till 1855, during the minority of his son. In 1870, Prim and Serrano offered Ferdinand the crown of Spain, but he declined it. In 1869, he married (in Boston, Mass.,) Eliza Hensler, who had resided in Springfield, the daughter of a German shoemaker, a lady of rare beauty, and afterwards celebrated in America and Europe as a vocalist. She bears the title of countess of Edla. The king without a crown is somewhat celebrated as a painter and engraver.

FERDINAND I., king of the Two Sicilies, was the son of Charles III., of Spain, and b. 12th Jan., 1751. When Charles ascended the Spanish throne in 1759, F., though a minor, succeeded him on that of Naples under a regency. After his marriage, in 1768, with Maria Carolina, daughter of the empress Maria Theresa, he fell completely under her influence, and lost all his former popularity. The queen and her favorite minister, Acton (q.v.), ruled the kingdom. F. joined England and Austria against France in 1793, but in 1801 was forced to enter into a treaty with the first consul. A subsequent violation of this treaty compelled him, in 1806, to take refuge in Sicily, under the protection of the English. A French army marched into Naples, and took possession of the kingdom, which Napoleon bestowed first on his brother Joseph, and afterwards on Murat. F. was reinstated by the congress of Vienna, and entered Naples, after Murat's flight, in June, 1815. His queen had died in 1814. During the revolution of 1820, he was obliged to introduce the Spanish constitution of 1812, but abolished it next year, with the help of Austrian arms. He, however, expelled the Jesuits, and abolished superfluous convents; acts that may, perhaps, partly atone for his bloody persecution of the republicans in 1800, and his general antipathy to enlightened principles of government. He died Jan. 4, 1825, and was succeeded by his son Francis I., who died in 1830.

FERDINAND II., king of the Two Sicilies, was the son of Francis I., by his second wife, Isabella Maria, of Spain, and was b. 12th Jan., 1810. He succeeded his father in 1830. The country was in the most wretched condition; and all eyes were turned to the young king, the beginning of whose reign was marked by various acts of clemency towards political enemies, and also by the introduction of reforms in the economy and government of the country. But it was not long before he began to listen to foreign counsels, which saw danger for the whole peninsula in liberal measures. From that time, Naples became the scene of incessant conspiracy, insurrection, bloodshed, and political prosecutions. F. yielded to the storm of 1848, and granted a constitution to both parts of his dominions; he was even obliged to take part in the war against Austria, in Northern Italy. The Sicilians mistrusted, and with reason, the king's proceedings, and declared that he and his family had forfeited the Sicilian crown. F. followed the constitution so far as to call the chambers together, but quickly dismissed them, impatient of any interference with his authority. After the subjugation of Sicily, in 1849, when the reaction began to set in all over Italy, he hastened completely to set aside the new constitution; while all who had taken any part in state reforms were subjected to those cruel persecutions that the letters of Mr. Gladstone have held up to the execration of the world. F. died 22d May, 1859, and was succeeded by his son Francis II.

FERDINAND I., 1000–1065; surnamed THE GREAT, first sovereign of independent Castile, was the second son of Sancho III., of Navarre, who, about 1026, compelled Bermudo III., of Leon, the last direct descendant of Pelayo in the male line, to surrender his rights over Castile, and also to give his sister Sancha in marriage to Ferdinand, then regent of that province. Sancho, towards the close of his energetic life, divided his extensive domains among his four sons, Castile being the portion allotted to the second. Bermudo of Leon, shortly after Sancho's death, sought to recover his lost possessions, but was defeated and slain. Ferdinand, now king of Leon as well as Castile, by a conciliatory yet firm policy, soon established his authority over his conquered subjects; and when, in 1053, his dominions were invaded by his brother Garcia III. of Navarre, the attack resulted in the death of the latter on the battlefield of Atapuerca, near Burgos, and the annexation of a large portion of his dominions. At an early period of his reign Ferdinand began to direct his arms against the Moors; and by a series of successful campaigns he extended the Christian frontier from the Douro to the Mondego, and reduced to vassalage the emirs of Toledo, Saragossa, and Seville. Even the Arab chronicles mention his victories from Badajoz, in Estremadura, to Albarracin in Aragon. He had set out on an expedition against Valencia, when he was seized with a mortal illness, which compelled him to retire to his capital, where, after having divided his dominions among his three sons, he died. Ferdinand appears to have laid claim to the title of "emperor" of Spain; and Mariana alleges that at a council held at Florence in 1055, the emperor Henry III., lodged a formal complaint against this infringement of his rights of suzerainty; that this complaint was sustained by Pope Victor II., but that at a conference afterwards held at Toulouse a decision favorable to Ferdinand's imperial rights, so far as they related to the territories which had been conquered from the Moors, was given, chiefly in consequence of the representations made by the famous Cid, Ruy Diaz de Bivar. Though this statement can be received not without reserve, it is certain that both in virtue of the ascendancy he won for himself in Christian Spain, and also in virtue of his notable successes over the Moors, Ferdinand I. is fully entitled to the rank which tradition has assigned him among the greater Spanish sovereigns. [From *Ency. Brit.*, 9th ed.]

FERDINAND II., 1136–88; younger son of Alphonso VIII., became king of Leon on the death of his father in 1157. A dispute that arose between him and some of his powerful nobles gave his brother Sancho III. of Castile a pretext for invading his territory, but the timely submission of Ferdinand averted serious disaster. The death of Sancho shortly afterwards led to a military occupation of Castile by Ferdinand, professedly in the interests of his nephew Alphonso III.; and this occupation lasted till the marriage of Alphonso to Leonora, daughter of Henry II. of England, in 1170. Meanwhile Ferdinand, having repudiated his wife, Dona Urraca, had become involved in a war with his father-in-law, Alphonso I. of Portugal, which resulted in the defeat and capture of the latter at Badajoz in 1169. The later years of the reign of Ferdinand II. were distinguished by sundry successes over the Moors, especially by a brilliant victory at Santarem; and also by the incorporation of the great military order of Alcantara, which received its first regular charter from pope Alexander III. in 1177. He died at Benavente, Leon, in 1188, and was succeeded by his son Alphonso IX. [From *Ency. Brit.*, 9th ed.]

FERDINAND III., 1200–52, King of Castile and Leon, usually known as SAINT FERDINAND, was the son of Alphonso IX. of Leon, and of Berenguela, sister of Henry I. of Castile. On the death of Henry, without issue, in 1217, the just title of Blanche, the elder of the surviving sisters, was set aside, and Berenguela procured the proclamation of Ferdinand. He rapidly secured the homage of the towns and submission of the nobles, especially of the brothers Alvaro and Ferdinando de Lara. On the death of his father in 1230, he ultimately, though not without dispute, became king of Leon as well as Castile, thus finally uniting the two kingdoms under one crown. Following up the

advantage which had been gained for the Christian arms by his father and the allied kings in the great battle at Las Navas de Tolosa in 1212, he devoted all his energies to the prosecution of the Moorish war. Among his conquests may be mentioned those of Ubeda in 1234, of Cordova in 1236, of Jaen in 1245, and of Seville in 1248. He was planning an invasion of Africa, when he died at Seville, leaving his kingdom to his eldest son Alphonso X. Though not canonized till centuries afterwards (by Clement X. in 1671), he came to be popularly known as *el Santo* from a very early period. Distinguished though he was for great military talent, he was still more remarkable for his religious zeal. Like his younger cousin Saint Louis of France, he was supremely a champion of the Roman Catholic faith. It was not on the field of battle alone that his ardor was displayed. None of his Spanish panegyrists fail to relate how it was his wont to assist in carrying wood for burning the followers of the Albigensian heresy, and how sometimes with his own royal hands he applied the torch to the pile. While as a crusader he is hardly eclipsed by Louis, he contrasts very favorably with him as a sincere friend of learning. He was the original founder of the university of Salamanca, which his son and successor did so much to foster and encourage. He it was, also, who caused to be translated into the vulgar tongue the Fuero Juzgo or code of Visigothic laws, which, as collected and translated at his instance, has the double interest of being one of the oldest extant specimens of Castilian prose, and also of being the foundation of Las Siete Partidas, the code of Christian Spain, which was finally drawn up by Alphonso the wise. [From *Ency. Brit.*, 9th ed.]

FERDINAND IV., 1285–1312; King of Castile and Leon, succeeded his father, Sancho IV., in 1295. The years of his minority were disturbed by a series of civil wars caused by the pretensions of his cousins Don Juan and Don Alonso de la Cerda to the crown, by the disputes of Haros, Laras, and other nobles about their privileges, by the restlessness of the municipalities, and by the ambition of the neighboring kings of Portugal, Aragon, and Granada. The queen-mother, Maria de Molina, on each new outbreak succeeded in procuring peace by diplomatic tact and judicious compromise. Secure at last in possession of his throne, Ferdinand was free to pursue the traditional policy of war against the Moors; and in carrying it out he was aided by pecuniary grants from his own nobles and from the pope (Clement V.), as well as by the spoils of the templars on the extinction of that order in 1310. His chief exploit, as recorded by the historians, both Spanish and Arab, was the expedition against Algeciras in 1309, which, while unsuccessful in its main object, resulted in the surrender of Gibraltar and the cession of other strongholds. In the course of a subsequent campaign he died suddenly at Jaen. According to Mariana, he had on the 8th of Aug. preceding condemned to death without lawful trial two brothers of the name of Carvajal. These protesting their innocence, had summoned him to meet them within thirty days at the bar of God; hence his surname, *el Emplazado*, "the Summoned." He was succeeded by his infant son, Alphonso XI.—[From *Ency. Brit.*, 9th ed.]

FERDINAND THE CATHOLIC, 5th of Castile, 2d of Aragon, 3d of Naples, and 2d of Sicily, was b. 10th Mar., 1452. He was the son of John II., king of Navarre and Aragon; and in 1469 married, at Valladolid, Isabella, sister of Henry IV. of Castile. Even in the lifetime of his father, events were paving the way for the subsequent union of the two kingdoms of Castile and Aragon. On the death of Henry IV. of Castile in 1474, the cortes refused to acknowledge the legitimacy of his daughter Juana, and proclaimed Isabella and her husband F. joint-sovereigns. A war ensued, in which they were completely successful. In 1479, F. becoming king of Aragon on the death of his father, the two kingdoms of Aragon and Castile were united in the persons of F. and Isabella. Isabella, however, as long as she lived, maintained her position as queen of Castile, and allowed her husband no other share in the government than the privilege of affixing his signature to the decrees, and of uniting his arms with her own. F.'s whole reign was an uninterrupted series of successful wars. In Castile, he distinguished himself by the effectual suppression of the banditti, who had become formidable in the confusion resulting from the civil wars. This he accomplished by reorganizing and putting in force against them the *hermandad*, or brotherhood, a kind of Spanish militia, composed of the citizens and the country-people. But F., whose craft and vigor were quite Machiavelian, was not content with taking strong measures against the Castilian outlaws: he also resolved to break the power of the feudal nobility, and make good use of the *hermandad* in carrying out this design. Cities and towns were encouraged to make themselves independent of the nobles, who were deprived of many important privileges. Among other humiliations, they were subjected to the ordinary tribunals of justice. The establishment of the inquisition in 1478–80, although primarily and mainly intended to further "religious" ends, likewise helped to lessen their influence. F. also strengthened his power by vesting in himself and his successors the grand-mastership of the military orders of Calatrava, Alcantara, and Santiago. In all his schemes, F. was ably seconded by his queen Isabella, and by the celebrated cardinal Ximenes. The year 1492 was the most brilliant in his reign, and is one of the most important in the history of the material progress of the world. It was signalized by the discovery of America by Christopher Columbus, though the honor of having aided the great navigator belongs not to F., but to Isabella. The same year witnessed the

capture of Granada, and the retreat of the last Moorish monarch into Africa. F., who had a true Spanish hatred of heresy, immediately issued an order for the expulsion of the Jews from the conquered kingdom; and, in consequence, 160,000—some say 800,000—of his new subjects were compelled to scatter themselves over Europe This act was neither wise nor Christian, but it was in accordance with the religious barbarism of the age, and especially of Spain. It was followed, several years after, by the persecution and expulsion of the Moors—an act still more unwise than the former, for the Moors of Granada were unquestionably the most industrious, civilized, and refined inhabitants of the peninsula. F. was as successful abroad as at home. He was victorious over Alfonso V., king of Portugal; while his general, Gonzalvo de Cordova, twice wrested Naples from the French—the second time in 1503—after which it remained permanently in F.'s possession. In the following year, Isabella died; and in 1505, he married Germaine de Foix, a niece of Louis XII. of France. He took part in the famous league of Cambrai formed against Venice in 1508; made himself master of various towns and fortresses in Africa; and in 1512, conquered the kingdom of Navarre; thus becoming monarch of Spain from the Pyrenees to the rock of Gibraltar. He died at Madrigalejo, Jan. 23, 1516; and was succeeded by his grandson, Charles V. To F. and Isabella, Spain owes her unity and greatness as a nation; and, in the no less skillful hands of their successor, she exercised an imperial influence over Europe, which it required Luther and the reformation to check. See Prescott's *History of the Reign of Ferdinand and Isabella of Spain* (1838).

FERDINAND VI., 1713–59; King of Spain, sometimes called THE SAGE, the younger son of Philip V. and Maria Louisa of Savoy. On the death of his elder brother, Louis, in 1725, Ferdinand was proclaimed prince of the Asturias; and in 1729 he was betrothed to Barbara, daughter of John V. of Portugal. He succeeded his father on July 9, 1746. Since 1739, Spain had been involved in protracted war, first with England in consequence of disputes relative to British interests in the West Indies, and afterwards, since 1740, with Austria on the accession of Maria Theresa. It was Ferdinand's first endeavor on coming to the throne to secure peace for his exhausted country, and one of the earliest acts of his government was to order the withdrawal of the Spanish troops from Italy. Soon afterwards negotiations were opened for peace with England; and these, though frequently interrupted, ultimately resulted in the treaty of Aix-la-Chapelle, which terminated the war of the Austrian succession, thus restoring peace to Europe, Oct., 1748. Weak in health and despondent in temperament, Ferdinand had no inclination thenceforward to take an active part in European affairs, and the management of the public business he abandoned almost entirely to his ministers Ensenada, Carvajal, and Wall. These, however, always found it necessary to take into their counsel the queen, to whom Ferdinand was much attached, the royal confessor Rabago, and the singer Farinelli, whose musical powers had given him extraordinary influence. During this reign the condition of Spanish finance was much improved; agriculture, commerce, and the arts were encouraged; by a concordat with pope Benedict XIV. in 1753, many abuses of ecclesiastical patronage were reformed; and the affairs of the army and navy were not neglected. On the outbreak of the seven years' war in 1756, Spain steadfastly maintained a strict neutrality, notwithstanding the repeated efforts of both France and England to secure her intervention, the former offering Minorca and the latter Gibraltar as the price of her assistance. On the death of his consort in 1758, Ferdinand fell into a profound melancholy, which issued in a confirmed insanity, under which he died at Villaviciosa. Leaving no issue, he was succeeded, according to the terms of the treaty of Aix-la-Chapelle, by his half-brother, Charles III.—[From *Ency. Brit.*, 9th ed.]

FERDINAND VII., King of Spain, b. 14th Oct., 1784, was the son of king Charles IV. and the princess Maria Louisa of Parma. Although he had the advantage of excellent preceptors, especially the canon Escoiquiz, in his youth, yet the machinations of the notorious Godoy, minister of Spain, prevented him from enjoying any opportunities for the intelligent exercise of his faculties. A deliberate attempt was made by his mother and Godoy to degrade him into a lover of mere animal pleasures, that their influence and authority might be unrestrained. F. soon conceived an aversion to the minister, which was increased by his marriage in 1802 with the amiable and accomplished Maria Antonietta Theresa, daughter of Ferdinand I., king of the Two Sicilies. This lady, who endeavored to maintain her husband's dignity, died 21st May, 1806, of grief, as is supposed, at the insults offered to her by Godoy, the king himself, and above all by the queen. Suspicions of foul play, however, were entertained by Ferdinand. Mainly for the purpose of gratifying their hatred towards Godoy, a number of the nobles, headed by the duke of Infantado, assembled round the crown-prince. A false step that the latter now took proved the beginning of great misery to Spain. By the advice of the canon Escoiquiz, he wrote a letter to Napoleon, in which he expressed a wish to marry the eldest daughter of Lucien Bonaparte. This letter fell into the hands of the minister himself, and the prince was in consequence arrested in the Escorial, 28th Oct., 1807, and declared a traitor by a royal proclamation, written in Godoy's own hand, and addressed to the council of Castile. The animosity of the people towards the minister led to the revolution of Aranjuez, and the king abdicated in favor of F., 19th Mar., 1808. Almost immediately after, however, Charles wrote to Napoleon, declaring his abdication to be

forced. Napoleon, who had designs of his own upon Spain, refused to recognize F. as king, but sent him an invitation to meet him at Bayonne. In spite of all warnings to the contrary, F. repaired to Bayonne, at which place he arrived on the 20th April, and was received with distinction by Napoleon. Meanwhile, however, the French troops under Murat had marched across the Pyrenees, and taken possession of the Spanish capital. The wretched squabbles and recriminations that now took place between Charles and his son, and which were encouraged by Napoleon, ended in F.'s renouncing the crown of Spain unconditionally, receiving for himself and his posterity an annual income of 600,000 francs from the crown revenues of France, and likewise the palace and parks of Navarre. The château of Valençay, belonging to prince Talleyrand, was assigned to him as a residence, along with his brother Don Carlos, his uncle Don Antonio, the canon Escoiquiz, and the duke of San Carlos. Here his proceedings were watched with the utmost vigilance; and it was not till the end of the year 1813, when the splendid series of British triumphs in the peninsula had made a longer occupation of the country by the French impossible, that Napoleon offered to reinstate him on the throne of Spain. On the 14th of Mar., F. returned to Spain, where he was received with every demonstration of loyalty and affection. Very unfortunately for Spain, and also for his own comfort, F. had, in the mean time, learned to associate liberalism with Jacobinism, and both with Bonapartism, so that, on his reaccession to power, he threw himself into the hands of the clergy and the reactionary portion of his nobility. Even before his arrival in Madrid, he refused to swear or accede to the constitution of the cortes, as interfering too much with the free exercise of regal authority, though he promised another in its place. From the moment, however, that he assumed the reins of government, a series of transactions took place which excited the astonishment and disgust of all liberal-minded politicians in Europe. Instead of the promised constitution, there commenced a fearful system of persecution against all who were suspected of holding liberal opinions; and executions, imprisonment, exile, and confiscation of property reigned in all parts of the kingdom. The monastic orders, the inquisition, and the rack were restored, and every expression of opinion rigorously repressed. At length, in Jan., 1820, an insurrection broke out, and F. was compelled to restore the constitution of the cortes of 1812; but the French government interfering by force of arms, absolutism was restored in Spain in 1823. In 1829, F. married the notorious Maria Christina. She was his *fourth* spouse. By the first three, he had no children. Maria, however, bore him two children: Isabella II., the late queen of Spain, and the infanta Maria Louis, who married the duke of Montpensier. By the influence of Maria Christina, F. was induced to abrogate the Salique law excluding females from the throne, and to restore the old Castilian law of cognate succession. This step led to a dangerous combination among the adherents of the king's brother, Don Carlos, even during the lifetime of the former, and after his death, to a civil war. See DON CARLOS, ESPARTERO, etc. On the 20th June, 1833, the deputies, cortes, and grandees of the kingdom took the oath of fealty, and did homage to the princess of the Asturias, and F. died on the 29th Sept. of the same year.

FERDINAND III., grand duke of Tuscany, and archduke of Austria, was b. at Florence, 6th May, 1769. In 1790, he succeeded his father, Leopold II., in the government of Tuscany, when the latter obtained the imperial throne at the death of the emperor Joseph II., Leopold's brother. F.'s rule in Tuscany was one of combined mildness and ability; and during his reign were inaugurated many judicial, economical, and legislative reforms: commerce was protected and encouraged; hospitals and asylums founded, good roads opened through the state, and the greatest attention bestowed on the welfare of his subjects, which an enlightened and good prince could exercise. A lover of peaceful progress, he remained strictly neutral in the first coalition against France, and was the first sovereign in Europe to recognize and treat diplomatically with the French republic in 1792. In 1793, intimidated by the combined menaces of the Russian and British cabinets, F. was constrained to relinquish his neutral policy, and become a passive member of the coalition formed by the above governments against France. In 1795, on the French occupation of Piedmont, he speedily reassumed friendly relations with France. In 1797, in order to save his states from annexation to the Cisalpine republic, F. concluded a treaty with Bonaparte on most unfavorable terms; undertaking to pay a war-levy to France, and to transfer to the museum of Paris some of the chief master-pieces of the Florentine galleries, including the "Venus de' Medici." Owing to the continued intrigues of France in his states, F. was forced to seek an Austrian alliance, which furnished Bonaparte with a pretext for declaring war simultaneously against Austria and Tuscany. In 1799, F. retired to Vienna, leaving the French troops in occupation of Tuscany. In 1801, at the peace of Lunéville, he was forced to renounce all claim on Tuscany. In 1814, the peace of Paris reinstated him in Tuscany, and even restored his artistic treasures. He died 17th June, 1824, leaving his states to his son Leopold II.

FERENTI'NO, a t. of Central Italy, in the province of Rome, and about 50 m. s.e. of the city of Rome. Portions of the ancient walls, built in the cyclopean style of large irregular and polygonal blocks of limestone, and patched or surmounted with Roman

masonry, no mortar having been used, are still extant. F. is the ancient Ferentinum, a city of the Hernici. Pop. 10,200.

FERGHANA, a province of Russian Turkestan, comprising a valley surrounded on three sides by the w. ranges of the Thian Shan mountains; pop. '70, 900,000, of whom one third are nomads. The productions are wheat, rice, maize, sorghum, millet, cotton, tobacco, madder, etc. The climate is equable and generally healthy. Rock salt, naphtha, gypsum, iron, lead, coal, and sulphur are found. The Russians have divided the province into seven districts. The affairs of the nomads are managed by their own elders.

FERGUSON, ADAM, a Scottish philosopher and historian, was born (1724) at Logierait, Perthshire, where his father was parish minister. He studied at the universities of St. Andrews and Edinburgh, and was appointed (1744) chaplain to the 42d regiment, in which capacity he was present at the battle of Fontenoy, and is said to have charged the enemy sword in hand, among the foremost of the regiment. In 1757, he succeeded David Hume as keeper of the advocates' library in Edinburgh. He was next appointed professor in the Edinburgh university, first of natural philosophy, in 1759, and subsequently (1764), of moral philosophy—a subject which had always had great attractions for him. While holding this office, he accompanied the young earl of Chesterfield (1774) on his travels on the continent; and in 1778–79, he acted as secretary to the commission sent out by lord North to try to arrange the disputes between the North American colonies and the mother country. The state of his health induced him, in 1784, to resign his professorship, in which he was succeeded by Dugald Stewart. In 1793, he visited various parts of the continent; and on his return, took up his residence for some time at Neidpath castle, in Tweeddale, and latterly in St. Andrews, where he died, 22d Feb., 1816. His chief works are—*Essay on the History of Civil Society* (Lond. 1767); *Institutes of Moral Philosophy* (Lond. 1769); *History of the Progress and Termination of the Roman Republic* (Lond. 1783); and *Principles of Moral and Political Science* (Lond. 1792). The work by which he is best known is his *History of the Roman Republic;* this, together with the essay and institutes, have gone through a number of editions. All his works have been translated into German and French, and the institutes has been used as a text-book in several foreign universities. F. was distinguished for the decision and manliness of his character.

FERGUSON, JAMES, was b. (1710) near Keith, a village in Banffshire, Scotland. His father being a poor day-laborer, he enjoyed only three months of instruction at school, and his subsequent acquirements were the result of his own insatiable thirst for knowledge. His tastes lay principally for practical mechanics and astronomy; and while keeping sheep, to which he was early sent, he was constantly employed in making models of mills, etc., and at night in studying the stars. After working at various country employments, he took to drawing patterns for ladies' dresses, and copying pictures and prints with pen and ink. He then supported himself and his parents by drawing portraits, first in Edinburgh, and afterwards (1743) in London; his leisure time being all the while given to astronomical pursuits. In 1748, he began lecturing on astronomy and mechanics with great acceptance. He was elected a fellow of the royal society in 1763, and received from George III. a pension of £50. He now gave up portraits, and devoted himself to lecturing and writing on his favorite subjects. He died in 1776. F. was held in high esteem for the worth and amiability of his character, as well as for his extraordinary and self-taught acquirements. Few men have done more to promote a knowledge of the results of science, among those who have not the advantage of regular scientific training. His principal works are *Astronomy explained upon Sir Isaac Newton's Principles* (1756; sir David Brewster's ed., 2 vols., 1811); *Lectures on Mechanics, Hydrostatics, Pneumatics, and Optics* (1760); also edited by sir David Brewster in 1805; and *Select Mechanical Exercises*, with an autobiography (1773).

FERGUSON, JAMES, 1797–1867; b. Scotland; came to New York in 1800. He was one of the engineers who laid out the Erie canal, and in 1819–22, assistant surveyor in the boundary commission under the treaty of Ghent; and astronomical surveyor for that commission in 1822–27. He became first assistant of the U. S. coast survey in 1833, and in 1847, assistant astronomer of the U. S. naval observatory. He discovered the following asteroids: Euphrosyne in Sept., 1854; Virginia in 1857; Echo in 1860, for which he was awarded the astronomical prize medal by the academy of sciences of France. He was contributor to Dr. Gould's *Astronomical Journal* and to the *Astronomische Nachrichten;* also to the Episcopal *Church Review*, to the *Merchants' Magazine*, and to other standard publications.

FERGUSSON, JAMES, b. Scotland, 1808; educated in Edinburgh and in England, and went into business in India. This he soon gave up and journeyed through various parts of the east, chiefly with a view of studying the styles of architecture. One of the first results of his studies was *Illustrations of the Rock-cut Temples of India.* He also published *Picturesque Illustrations of Ancient Architecture in Hindustan; Essay on the Ancient Topography of Jerusalem;* and a *Historical Inquiry into the True Principles of Art, more especially with reference to Architecture.* This volume is the first of a projected work in three parts, comprising a universal compendium of past art—Hindu, Mohammedan,

Gothic, etc. The materials collected for this work were used in his *Handbook of Architecture*, published in 1855. Later he issued an *Essay on a Proposed New System of Fortification*, by earthwork. A pamphlet of practical suggestions for the improvement of the British museum and of the national gallery was followed by a "New Design" for the latter at the academy exhibition of 1850. He is also the author of *The Palaces of Nineveh and Persepolis Restored*, published in 1851, and was the architect of the Nineveh court in the crystal palace, Sydenham. Since 1859, he has been one of the royal commissioners to inquire into the defenses of the United Kingdom. In 1862, Mr. Fergusson published a *History of the Modern Styles of Architecture* as a sequel to the handbook, and in 1865 remodeled the whole, and published it as *A History of Ancient and Modern Architecture*, in 3 vols. In addition to these works, he published, in 1868, *Tree and Serpent Worship*, with upwards of 100 plates and illustrations. In 1871, he received the royal gold medal, annually awarded to an eminent architect, or writer on architecture. His latest work is entitled *The Temples of the Jews and the other Buildings in the Haram Area at Jerusalem.*

FERGUSSON, ROBERT, a Scottish poet, was b. at Edinburgh on the 17th Oct., 1751, and received his education at the university of St. Andrews, where he was in possession of a bursary founded by a person of his own name, and resided four years. Subsequently, he removed to Edinburgh, and was employed in the office of the commissary clerk. His poems were chiefly contributed to *Ruddiman's Weekly Magazine*, and gained him considerable local reputation. Unhappily, this reputation proved his ruin. His society was eagerly sought; and in that convivial time, he was led into excesses which permanently ended his health. He fell into a religious melancholy, and finally, through an accidental fracture of the skull, became totally deranged. He died on the 16th Oct., 1774, at the age of 23. His poems were published in 1773.

F.'s poems are distinguished by considerable humor, fancy, and purity of language, and he possessed great mastery over lowland Scotch. He sketches with liveliness contemporary life and incidents, and much of our knowledge of old Edinburgh is derived from his verses. His fame, however, rests quite as much upon his unhappy life and early death, and upon the circumstance that he was to some extent the forerunner of Burns, as upon the essential merits of his verse. Burns admired his works, was indebted to them for hints, called him "his elder brother in the muses," and when he came to Edinburgh, erected a memorial-stone over his grave.

FERGUSSON, Sir WILLIAM, 1808–77; a Scotch surgeon, educated in Edinburgh university. At the age of 20 he became a licentiate of the college of surgeons, and in the following year a fellow. In 1836, he was surgeon to the royal infirmary, and in 1840, professor of surgery in King's college, London. In 1849, he was appointed surgeon-in-ordinary to the prince consort, and in 1860, sergeant-surgeon to the queen. He was celebrated for self-possession in critical circumstances, attention to details, and refinement of touch; and relied more on his mechanical dexterity than on complicated instruments.

FERIÆ (Lat.), holidays during which political and legal transactions were suspended in ancient Rome, and slaves enjoyed a cessation from labor. F. were thus *dies nefasti*, the opposite of the *dies fasti*. See FASTI. Days which were consecrated to a particular divinity, on which any public ceremony was celebrated, and the like, were feriæ. In contradistinction to these, which were *F. publicæ* (public holidays), there were *F. privatæ*, which were observed by single families, in commemoration of some particular occurrence of importance to them or their ancestors. Birthdays, days of purification after a funeral, etc., were also observed as family feriæ. The public F. were divided into those which were always kept (*stativæ*) on certain days marked in the calendar; and those which were kept by command of the consuls or other superior magistrates on the occasion of any public emergency. "The manner in which all public F. were kept bears great analogy to our Sunday. The people generally visited the temples of the gods, and offered up their prayers and sacrifices. The most serious and solemn seem to have been the *F. imperativæ;* all the others were generally attended by rejoicings and feasting." See an elaborate article by Dr. Schmitz in Smith's *Dictionary of Greek and Roman Antiquities.* In Scotland, those days during which it was not lawful for courts to be held, execution to proceed, or any other judicial step to be taken, used to be called *feriat* times, but the expression is obsolete.

FERID-EDDIN-ATHAR, or FARID-UDDIN-ATTAR, 1119–1229; a Persian poet and mystic, who died at the age of 110 years. He was Mohammed ben Ibrahim, the son of a druggist, and brought up to his father's business. "Ferid-Eddin" was an honorary title, signifying "pearl of religion." To this he added "athar" (which means "druggist"), and so quite changed the real name. He studied the mystic philosophy of the Sufis, and was recognized as one of its principal representatives. He was a voluminous writer, leaving no fewer than 120,000 couplets of poetry. His most famous work is the *Mantic Uttair*, or language of birds, an allegorical poem containing a complete survey of the life and doctrines of the Sufis. According to the poet, the birds, weary of a republic, longed for a king. As the lapwing, having guided Solomon through the desert, best knew what a king should be, he is asked whom they shall choose. "The Simorg in the Caucasus," is his reply. But the way to the Caucasus is long and dan-

gerous, and most of the birds excuse themselves from the journey. A few, however, set out; but by the time they reach the great king's court, their number is reduced to 30. The 30 birds, wing-weary and hunger-stricken, at length gain access to their chosen monarch, the Simorg; but only to find that they strangely lose their identity in his presence—that they are he, and he is they. In such strange fashion did the Persian poet image forth the search of the human soul after God, and its absorption into the divine.

FERISH'TA, MOHAMMED KASIM, a Persian historian, author of a history of India, reputed to be one of the most trustworthy of oriental historians. He gives a brief history of the country prior to the Mohammedan conquest, and of the victorious progress of the Arabs through the east; following with a history of the kings of some of the provinces, of the Mussulmans of Malabar, the Mussulman saints of India, and the geography and climate of the country.

FERMANAGH, an inland co. in the s.w. of the province of Ulster, Ireland. It is 45 m. long, and 29 broad; area, 714 sq.m.—$\frac{3}{5}$ arable, $\frac{1}{16}$ in wood, and above $\frac{1}{4}$ in water, including upper and lower lough Erne, and the smaller lakes, Melvin and Macnean. The surface is mostly a succession of mountains and hills, and the scenery varies. The chief rocks are limestone, with many cavities and underground watercourses, millstone grit, and old red sandstone. Some coal, iron, and marble occur. The chief rivers are the Erne and its tributaries, the Colebrooke, Woodford, and Arney. The soil in the low grounds is a deep rich loam, but in the limestone and sandstone districts it is cold and thin. The climate is mild and moist. Marsh-fever prevails in summer and autumn near lough Erne. In 1877, 107,323 acres were in crop; oats, barley, wheat, potatoes, turnips, and hay being the chief products. The chief exports are oats, butter, and eggs. F. is divided into 8 baronies and 23 parishes. It returns two members to parliament. Principal towns: Enniskillen, Lisnaskea, and Lowtherstown. Pop. '51, 116,047; '61, 105,373; '71, 92,688, of whom 51,736 were Roman Catholics, 35,549 Episcopalians, and 1755 Presbyterians. A little coarse linen is manufactured in the county. In 1876, there were 16,640 pupils attending the national schools of Fermanagh. The chief antiquities are raths or rude hill-forts, and some ecclesiastical ruins.

FERMAT, PIERRE DE, a French mathematician, was b. at Toulouse in 1590, and at an early period, in conjunction with his friend Pascal, hit upon a very ingenious mode of considering figurate numbers, upon which he subsequently based his doctrine of the calculation of probabilities. F. employed himself greatly with the properties of numbers, and made many acute discoveries in regard to their composition and analysis. He also squared the parabola in a much simpler way than Archimedes at an earlier period had done, and made many other discoveries in geometry. His method of finding the greatest and least ordinates of curved lines was analogous to the method of the then unknown differential calculus. In addition to his scientific attainments, F. possessed an extraordinary knowledge of ancient and modern languages. He died at Toulouse in 1665. A collection of F.'s works appeared at Paris in 1679.

FERMATA, in music, is the name given to a pause, or resting-point, generally marked by the sign ⌒. The notes over which this sign is placed are prolonged beyond their true length. The F. is frequently found near the end of a part of a composition, which affords an opportunity for the singer or player to introduce an extempore embellishment.

FERMENTATION is the term applied to the change which occurs in one organic substance when influenced by another in a state of decay or putrefaction. The process was originally understood to include all the changes which matter of plant and animal origin undergoes when disunited from the living force, but is now restricted to certain of the changes. Thus, there are many substances, such as starch and sugar, which have no power of themselves to pass into decay, or change in composition through lengthened periods of time; whilst there is another class of substances, including albumen, fibrin, and caseine, as well as gelatinous tissues, mucus, etc., which, when exposed to moderately heated air in a moist condition, more or less rapidly begin to putrefy or decompose. The latter substances, viz., those which spontaneously pass into a state of change, are called *ferments*, and when they are brought into contact with sugar, etc., which otherwise would not be altered, they cause the latter to be broken up into simpler compounds; it is this process that constitutes fermentation. The ferment is always a body which has the power of rotting or becoming putrid, and is actually in a state of decomposition. Every substance which is liable to putrefy becomes, while putrefying, a ferment; and in this condition acquires the property of setting agoing the process of F. in any second body capable of it, and retains the power till it is so far decomposed that the putrescence is over. The ferments are very widely distributed in organic matter, and hence, whenever a plant or an animal dies, the process of F. proceeds more or less rapidly. The most important kind of F. is that known under the designation of *vinous*, and which forms part of the processes in the preparation of alcohol, beer, wine, etc. It consists in the action of a peculiar ferment called yeast (q.v.) upon a saccharine

liquid, when the sugar ($C_{12}H_{14}O_{14}$) is decomposed into two atoms of alcohol (each $C_4H_6O_2$), four atoms of carbonic acid (each CO_2), and two atoms of water (each HO). In this change it will be observed that the yeast, whilst it causes the change, does not unite directly or indirectly with any of the constituents of the sugar. The vinous F. proceeds best at a temperature ranging from 60° to 80° F., the mean and more desirable being about 70° F. The process itself causes the development of heat, and recourse must be had, therefore, to large airy rooms, where the fermenting tuns or vessels are arranged, and also to the circulation of cold water in pipes distributed round the interior of the vessels, and in contact with the liquid. See BEER.

The *lactic acid* F. takes place in milk when it begins to sour. The caseine of the milk acts the part of the ferment, and it causes the change in the sugar of milk, which is in part resolved into lactic acid ($C_6H_5O_5 + HO$). The latter then curdles the caseine, and the milk besomes clotted. When the milk still further sours, and the material is kept at a temperature of 77° to 86° F., the *butyric acid* fermentation takes place, in which the putrefying caseine changes the sugar (q.v.) of milk into butyric acid ($C_8H_7O_3 + HO$).

The *viscous* or *mucus* F. occurs when the juice of the beet-root, dandelion, ash-tree, etc., is allowed to decompose at a temperature of 90° to 100° F., when the albuminous matter present causes the sugar to ferment into lactic acid, mannite, a gummy substance, some alcohol, and various gases. The same kind of F. occurs when boiled yeast or boiled gluten is added to ordinary sugar.

The remaining processes of F. are the *benzoic* F., yielding, amongst other matters, the essential oil of bitter almonds (q.v); the *sinapic* F., which occurs in mustard when moistened with water, and during which the pungent oil of mustard is developed; and the *acetous* F., which is, however, not a true instance of F., as the oxygen of the air is required to complete the change. See ACETIC ACID.

FERMENTATION (*ante*), a chemical term originally applied to natural processes in which bubbles of air seem to be generated, producing what is called effervescence. Effervescence is, however, only a phenomenon which accompanies one of the most familiar instances of fermentation, and does not exist in all its forms. The commonest examples of fermentation are: the change of the juices of fruits to wine, cider, etc.; the souring of milk; and the putrefaction of animal or vegetable matter. As these changes occur without any notably exciting cause, they have been thought to be spontaneous; but no such thing as simple spontaneity exists in the case. On the contrary, experiment shows that no fermentable chemical species will ferment except it is in the presence of water, and is kept by that water in contact with some specific substance which by its presence excites and maintains the chemical activity of the kind in question. The substance which is thus the occasion of the chemical action is called a ferment. Even the simple fact of presence is not deemed to be enough. The ferment must itself change, but the cycle of change may cause a continuous reproduction of the agency, and thus result in the continuity of the fermentation.

Vinous fermentation may be selected for illustration, as one which is familiar in some of its many illustrations, such as the making of wine from grapes and currants, cider from apples, beer from grain, etc. The juice of grapes is an intensely sweet yellowish liquid, which may be made perfectly limpid and transparent by filtration through bibulous paper. If thus clarified, it will remain unchanged indefinitely; but if to it be added even a small quantity of the unclarified juice, fermentation will ultimately begin, and the liquid will become turbid. A finely divided substance is formed in the liquor, which rises to the surface as a scum, and is called yeast. The production of yeast is accompanied by the evolution of carbonic acid, which also comes to the surface, and is retained in bubbles by the viscous nature of the scum. The chemical change once begun becomes accumulatively more active in the presence of the increasing volume of yeast, until it reaches a climax, and then it dies away because the whole substance has been acted upon. The yeast settles to the bottom; a clear liquid remains, whose sweetness has given place to a vinous taste; from which it appears that the sugar has vanished, and instead, a new, volatile, inflammable substance called alcohol is present. The temperature of vaporization being lower for alcohol than for water, it may be driven off by processes of distillation, each repetition furnishing a greater proportion of alcohol, and may finally be obtained in a pure, or "absolute," form, when treated with some chemical which takes away the remnant of the water. It appears then that the vinous fermentation has occasioned a change in which sugar has given place to alcohol. The analytical statement of this change is expressed by Gay Lussac's formula, substantially, but not critically. He assigned to grape sugar the simple formula CH_2O, and for the reaction gives the equation—

$$\underset{\text{Sugar.}}{6(CH_2O)} = \underset{\text{Alcohol.}}{C_6H_{12}O_2} = \underset{\text{Carbonic Acid.}}{2C_2H_6O} + 2CO_2$$

or, 45 units of sugar give 23 units of alcohol and 22 of carbonic acid. Cane sugar has the formula, $C_{12}H_{22}O_{11} = 2(C_6H_{12}O_6) - H_2O$, or, two equivalents of grape sugar with one at w[illegible] It appears, on further investigation, that certain other compounds are formed

—thus 100 parts of cane sugar become, by absorption of water, 105.4 parts of glucose, which yield approximately—

Alcohol	51.1
Carbonic acid	49.4
Succinic acid	0.7
Glycerine	3.2
Matter passing to yeast	1.0
Total	105.4

even this does not account for the formation of a small quantity of fusel-oil, and some ethers.

Vinous fermentation is induced by *saccharomyces*, a genus of fungi, consisting of minute cells, sometimes isolated, sometimes grouped, but never forming a continuous tissue. Of the several species, *S. cerevisiæ*, the fungus of common yeast, used in making beer, is most important. Its cells have a diameter of about $\frac{1}{100}$ millimeter. Of the genesis of the yeast plant little is known. Its germs abound in harvest time about the vines and stalks of the grape, and in breweries and wine-cellars, but they are by no means generally diffused through the air.

The change in lactic fermentation is expressed by the equation—

Hydrated milk sugar. Lactic acid.

$$C_{12}H_{22}O_{11}+H_2O = 4C_2H_6O_3$$

Ordinary glucose dissolved in milk ferments to lactic acid, with the milk sugar, up to a certain maximum of acidity, when the change stops. Chalk or carbonate of soda neutralizes a part of the acid, and revives the fermentation. The agent of this fermentation is a microscopic fungus, consisting of single cells, much smaller than those of the brewers' yeast. Lactic ferment sometimes annoys brewers as an impurity in their yeast. The lactic ferment is not chargeable as the agent which ordinarily sours milk; this result is caused by a motionless bacterium which Lister calls *B. lactis*. Yet this bacterium, if made to pass through a certain round of changes, also produces lactic fermentation. The germs of this bacterium are thought to abound in the air of dairies and cow-stables, but are not generally diffused through the air.

Butyric fermentation is a change which occurs in milk or cheese, in which the lactic acid is broken up, as shown by the equation—

Lactic acid. Butyric. Carb. acid. Hydrogen.

$$2C_3H_6O_3 = C_4H_8O_2 + 2CO_2 + 2H_2$$

It is caused by the presence of an animalcule called a *vibrio*. This fermentation is one of a series of fermentations called putrefaction, of which the chemical reactions are very intricate. The agents are, with scarcely an exception, bacteria and vibrios.

FERMENTED AND DISTILLED LIQUORS, STATISTICS OF. Under the headings, BEER, SPIRIT, and WINE, will be found particulars as to the history, manufacture, etc., of these liquors. All that is contemplated in the present article, is a statement of the quantities manufactured and consumed in the United Kingdom of Great Britain and Ireland. In 1801, the consumption of spirits, British, colonial, and foreign, in the United Kingdom was 8,800,840 gallons. In fifty years, it had considerably more than trebled, having risen in 1851 to 28,760,224 gallons. In the same time, the population had risen from 15,506,794 to 27,452,262. In the former period, therefore, the consumption was at the rate of little more than half a gallon per head, while in the latter period it amounted to more than a gallon. There would seem, however, to have been something exceptional in the year 1801 to reduce the consumption to the low point we have mentioned, as in the previous year, the consumption was nearly 12 million gallons, and in the succeeding year, more than 15½ million gallons; and in no subsequent year did it fall so low as in 1801. The consumption at the two periods was divided over the three countries as follows: England, 1801, 6,150,983 gallons—namely, 2,555,920 British; 1,687,839 colonial; and 1,907,224 foreign. In 1851, 13,916,313 gallons—namely, 9,595,368 British; 2,542,395 colonial; and 1,778,550 foreign. In the former period, the consumption of each individual was less than three fourths of a gallon; in the latter, nearly seven ninths of a gallon. Scotland, 1801, 930,490—namely, British, 295,931; colonial, 349,237; and foreign, 285,322. 1851, 7,090,894—namely, British, 6,830,710; colonial, 179,883; and foreign, 80,301. The consumption per head in Scotland in 1801 was thus only three fifths of a gallon, while in 1851 it was 2⅝ gallons. Ireland, 1801, 1,719,367—namely, British, 355,106; colonial, 1,057,316; foreign, 306,945. 1851, 7,753,017—namely, British, 7,550,518; colonial, 158,147; foreign, 44,352. In the former period, the consumption per head was two thirds of a gallon; in the latter, about 1⅛ gallon. But there is every reason to believe, that the consumption in 1801 was much larger in the United Kingdom generally than the statistics indicate. Between the periods we have mentioned, the duty on British spirits varied considerably. In England, in 1802, it was 5*s.* 4½*d.* per gallon; in 1819, it had risen to 11*s.* 8½*d.*; and in 1851, it stood at 7*s.* 10*d.* In Scotland, in 1802, the duty was 3*s.* 10½*d.* per gallon; it rose to 9*s.* 4½*d.* in 1815; and in 1851, was 3*s.* 8*d.* In Ireland, in 1802, it was 2*s.* 10½*d.*; in 1815, it had risen to 6*s.* 1½*d.*; in 1851, it stood at

2s. 8d. The duties in the three countries have now been equalized, the sum fixed being at first 8s. per gallon, since raised to 10s., at which it now remains. In 1874, there were manufactured in Great Britain 35,352,232 gallons of proof spirits; imported for home consumption, 10,676,163; exported, 4,697,936: the consumption was therefore 41,330,459 (the pop. being about 32,000,000), or nearly 1¼ gallon to each. Of the total number of gallons of proof-spirits distilled in the United Kingdom in 1874 (35,352,232), there were 9,670,525 in England; 16,300,161 in Scotland; and 9,381,546 in Ireland. The number of gallons on which duty was paid in the United Kingdom in 1874 was 30,690,051, the duty amounting to £15,345,027. Of this sum, £6,741,037 was paid in England, £4,661,098 in Scotland, and £3,942,890 in Ireland. The number of gallons on which duty was paid in 1875-76 was 31,219,402. Of the whisky distilled in Scotland in 1874, 4,247,431 gallons were exported into England, and 851,304 into Ireland; Scotland receiving in return from England 68,977, and from Ireland 205,614. Ireland sent to England 2,682,457 gallons, and got back in return 133,148. Of foreign spirits, there were imported into the United Kingdom in 1874—rum, 8,150,372 gallons, of which 5,193,860 were for home consumption; brandy, 3,378,057 gallons, nearly all being for home consumption; and other sorts, including Geneva, 2,285,112 gallons, 1,178,160 for home consumption.

The quantity of wine entered for consumption in 1802 was 5,449,710 gallons, upon which a duty of £1,723,339 was paid. In 1851, 6,280,653 gallons; duty, £1,776,246. In 1877, 19,568,807 gallons were imported, of which 17,671,120 were retained for home consumption.

The quantity of beer manufactured in Great Britain and Ireland can only be arrived at approximately, the duty being leviable on the malt. The general estimate is, that two bushels of malt produce one barrel, or 36 gallons of beer. In 1874, the quantity of malt brewed in the United Kingdom was 58,728,687 bushels, equal to 29,364,343½ barrels, or 1,057,116,366 gallons of beer. This beer was made chiefly in England, 52,518,830 bushels of malt being consumed there; in Scotland, the quantity used was 2,952,134 bushels; and in Ireland, 3,257,723.

FERMENTED AND DISTILLED LIQUORS, STATISTICS OF (*ante*). An account of the liquor traffic in the United States for the year ending June 30, 1872, based on the internal revenue report for 1872, and the census returns of 1870, shows the following figures:

Number of distilleries	3,132
Number of breweries	3,421
Number of licensed retail dealers	161,144
Number of wholesale dealers	7,276
Sales of retail dealers, est., $5,000 each	$805,720,000
Gallons of distilled liquors produced	69,033,533
Barrels of fermented liquors	8,039,969
Total, imports added, gallons	337,288,066
Total cost	735,720,048

From the official report of the United States internal revenue department for the year ending June 30, 1879, it appears that the revenue derived from distilled liquors in that year was as follows:

Brandy distilled from apples, peaches, or grapes	$919,052 53
Spirits distilled from other materials	46,790,411 30
Rectifiers' special tax	160,123 21
Retail dealers	3,903,036 24
Manufacturers of stills, and stills and worms manufactured	3,525 85
Stamps for distilled spirits for export	17,212 20
Warehouse, rectifiers', and dealers' stamps	292,907 90
Interest on tax upon spirits	74,899 48
Total revenue from distilled spirits, year ending June 30, 1879	52,570,284 69
Revenue in the same year from fermented liquors	10,729,320 08
Total revenue from both kinds	63,299,604 77

The *National Temperance Almanac* for 1880 says: The select committee of the British house of lords lately made a report in which it was stated that the amount expended in that country for intoxicating liquors rose from £84,222,171 in 1860, to £147,288,759 in 1876. The consumption of alcohol as a beverage rose from about four gallons per head in 1856 to nearly double that sum in 1875. From other sources it is learned that in the year ending Sept. 30, 1878, licenses were issued in the United Kingdom to 2,641 common brewers, not licensed to sell beer by retail; to 99,337 victualers; to 28,453 keepers of houses where beer may be drunk on the premises, and 6,691 where beer may not be consumed on the premises. Licenses were also granted to 14,948 victualers and 7,158 keepers of beer-houses who brew their own beer. The quantity of malt consumed by common brewers during the year was 50,362,815 bushels; by victualers, 6,704,340 bushels; by persons licensed to sell beer to be drunk on the premises, 2,868,767 bushels; and by persons licensed to sell beer not to be drunk on the premises, 594,083 bushels. During the year ending on the 31st Dec., 1879, 58,543,252 bushels of malt were made in

the United Kingdom, and the duty charged amounted to £7,939,099. The total amount realized for brewers' licenses was £411,831, and the declared value of beer exported from the United Kingdom was £1,918,886.

FERMENTED LIQUORS are alcoholic beverages made by fermentation of saccharine fluids and juices; the principal being the different kinds of *ale* or *beer*, made by fermentation of an infusion of malt, chiefly of barley, but also sometimes of other kinds of grain; and *wine*, made by fermentation of grape-juice. *Cider* is made by fermentation of the juice of apples; *perry*, of that of pears; *palm-wine*, by fermentation of the sap of different kinds of palm. Fermented liquors, commonly called wines, are also made from the juice of various kinds of fruit, as currant wine from that of the red currant; and from the juice of some roots, as parsnip wine from that of the parsnip, etc. The sap of the American aloe, or *agave* (q.v.), yields the fermented liquor called *pulque*, much used in Mexico. A wine is made from the sap of the birch, and that of some other trees is used for a similar purpose. *Mead* is a fermented liquor made from honey. From every fermented liquor, a kind of *spirit* may be obtained by distillation.

FERMO, a t. of Italy, in the province of Ascoli Piceno, is situated on a rocky height 4 m. from the Adriatic, and 32 m. s.s.e. of Ancona. It is well-built and fortified, surrounded with walls and ditches, is the seat of an archbishop, and has a cathedral and an elegant theater. Formerly F. possessed a university. It has some trade in corn and wool. Pop. 15,682. In the immediate vicinity are the ruins of the ancient Firmum, whose name F. inherits. Firmum had been a Roman colony from the year 264 B.C.

FERMOY, a t. in the e. of Cork county, Ireland, chiefly on the right bank of the Blackwater, 19 m. n.e. of Cork city. Its origin dates from the 12th c., when it was the seat of a great Cistercian abbey; but its present importance, which commenced in the end of last century, is due to Mr. (afterwards sir John) Anderson, who introduced mail-coaches into Munster. The hills to the s. of the town rise in Knockinskeagh 1388 feet. F. is handsomely built and regularly laid out. A large ecclesiastical establishment (Roman Catholic), consisting of a church, a bishop's house, two convents with large schools, and a college with nearly 100 students, has recently been erected on a hill rising from the Blackwater. A bridge of 13 arches, built in 1689, crosses the river. Infantry and cavalry barracks for 3,000 men stand on the left bank of the river, and command the approach to Cork. F. has a trade in agricultural produce. Pop. '61, 8,705; in '71, 7,611. The town-rates in 1871 were £341.

FERN, FANNY. See PARTON, JAMES.

FERN, MALE, a name given, in consequence of an erroneous notion, long since exploded, to a fern very common in the woods of Britain and of the continent of Europe, the *aspidium filix mas* of some botanists, and *lastræa filix mas* and *nephrodium filix mas* of others. The fronds are bipinnate; the pinnules oblong, obtuse, and serrated; the sori near the central nerve, orbicular, kidney-shaped, and fixed by the sinus; the stipes and rachis chaffy. If not one of the very finest of our ferns, it is certainly a chief ornament of many of our woods, and a plant of very considerable beauty. The subterranean stem (rhizome) is officinal. It is about a foot long and of the thickness of a quill, almost inodorous, with a nauseous sweet taste, becoming astringent and bitter. It was anciently used as an anthelmintic, and its use has been revived, especially in cases of tapeworm, in which it is believed to be very efficacious. Its anthelmintic powers are due to a thick, almost black volatile oil which it contains, and which is now itself also used in medicine.

FERN, SWEET, *Comptonia asplenifolia*, a shrub of the natural order *amentaceæ*, suborder *myriceæ*, a native of the mountain-woods of North America, forming a small bush with linear pinnatifid, fern-like leaves. Its leaves have a powerful aromatic fragrance when rubbed. It is tonic and astringent, and is much used in the United States as a domestic remedy for diarrhea.

FERNANDEZ, JUAN, a Spanish discoverer. While sailing along the coast of South America early in the 16th c., he found that the winds near the shore were almost constantly from the s., and that they greatly retarded his progress. Standing off shore he met the trade-winds which blew from a different direction, and made a voyage so remarkable for its short time that he was, on returning to Spain, arrested on a charge of sorcery. By some unusual leniency, however, his explanation was accepted and he was acquitted. During one of his voyages, 1563, he discovered the islands which now bear his name. See JUAN FERNANDEZ, *ante*. He was so pleased with their fertility and beauty, that he asked for their possession, and the Spanish government gave them to him in 1572. A colony was established, but it was not permanent, and the only relic of it is the goats, which have continued to thrive ever since. In 1574, he discovered the islands of St. Ambrose and St. Felix. His companions during a voyage made in 1576 say that he saw a large island or continent in the southern ocean. This, if not an illusion, may have been New Zealand, or Australia.

FERNANDINA, port of entry and seat of justice in Nassau co., Fla., on Amelia island, Atlantic coast, at the e. end of the Atlantic, Gulf, and West India Transit railroad, which runs across Florida in a s.w. direction to Cedar Keys, on the gulf of Mexico;

pop. about 2,500. It has an excellent harbor, considerable trade, and some manufactories. It is the seat of a Roman Catholic seminary. In the winter it is a place of resort for people from the north seeking a milder climate.

FERNANDO DE NORONHA, a lonely island of the southern Atlantic, in lat. 3° 50′ s., and long. 32° 25′ w., about 125 m. from the coast of Brazil, to which empire it belongs. It is about 8 m. in length. The surface is rugged, and rises into a peak about 1000 ft. high, the upper part of which is very steep, and on one side somewhat overhanging. The island is mostly covered with wood; but as little rain falls, there is not much of tropical luxuriance. It is used as a place of banishment for Brazilian criminals. No woman is allowed to land on the island. Pop. 2,000, half of whom are convicts, who cultivate small farms.

FERNANDO PO, an island on the w. coast of Africa, in the bight of Biafra, is situated about 20 m. from the nearest point on the shore, and is about 44 m. long and 20 m. broad. The appearance of this island from the sea is exceedingly picturesque and beautiful. It is traversed by a mountain ridge, which, in Clarence peak, rises to the height of 10,650 ft., and is fertile, well watered, and in many parts thickly wooded. Besides swarms of monkeys, some of which are of great size, the island contains many goats and sheep in a state of nature. The climate, always excessively hot, is rendered more intolerable during the rainy season by a pestilential wind from the continent. The native population, who are of negro race, are said to amount to from 10,000 to 12,000 in number, and to inhabit fifteen villages. The English, with the consent of Spain, into whose hands F. P. had fallen, made an attempt in 1827 to form a settlement on the island, but abandoned it in 1834. In 1844, it was again taken possession of by Spain. The colony has a population of about 900, most of whom are liberated Africans.

FERNAN-NUNEZ, a small t. of Spain, in the province of Cordova, and 10 m. s. of the town of that name. It has some linen and woolen manufactures. Pop. 5,500.

FERNS, *Filices*, an order of acrogenous or cryptogamous plants, divided by some botanists into several orders; whilst some make *filices* a sub-class, and include in it *lycopodiaceæ*, *marsileaceæ*, and *equisetaceæ*. See these heads. F. are either herbaceous perennial plants, or more rarely trees, the root-stock or the stem producing leaf-like *fronds* (often called leaves), which are sometimes simple, sometimes pinnated, or otherwise compound, exhibit great variety of form, and are generally coiled up (*circinate*) in bud. The fronds are traversed by veins, generally of uniform thickness, which are simple or forked, or netted, sometimes produced from the sides of a midrib or primary vein, sometimes from a primary vein on one side, sometimes radiating from the base of a frond or segment of a frond. The fructification takes place either on the lower surface or on the margin of the fronds, and arises from the veins. The spores are contained in capsules or spore-cases (*thecæ*, *sporangia*), which are often surrounded with an elastic ring, and are either naked or covered with a membrane (*involucre* or *indusium*), and are generally clustered in round or elongated or kidney shaped masses (*sori*). The margin of the frond is sometimes folded so as to cover the spore-cases, and sometimes, as in the flowering fern (*osmunda*) (q.v.), the fertile part of the frond is so transformed that its leaf-like character entirely disappears, and it becomes a spike or panicle. The spore-cases burst at their circumference, or longitudinally, or irregularly. Moving spiral filaments exist in F., but their functions in connection with reproduction are not well known. The reproduction of F. has been the subject of much investigation and discussion, and supposed discoveries of sexual organs have been announced, but satisfactory evidence of their nature has not been obtained.—The number of known species of F. is about 2,500. They are found in all parts of the world, but are fewer towards the poles than within the tropics, and fewer in continental than in maritime countries, abounding exceedingly in mountainous tropical islands, as in Jamaica. Many of them delight in moisture and shade, although some are found in the most exposed situations. Some of them resemble mosses in size and appearance; whilst tree ferns (q.v.) resemble palms, and sometimes attain a height of 40 feet. A few are climbers. One climbing species (*lygodium palmatum*) is found in North America as far n. as Boston.—F. are divided into *polypodieæ*, *hymenophylleæ*, *gleicheniæ*, *schizææ*, *osmundeæ*, *daneæ*, and *ophioglosseæ*, of which sub-orders (or orders) the first, second, fifth, and seventh alone contain British species, and the first contains a great majority of all ferns.—The root-stocks of some F. contain so much starch that they are either used as food, or food is prepared from them, particularly those of the tara (q.v.) F. in New Zealand and Van Diemen's Land, and those of *aspidium* (or *nephrodium*) *esculentum* in Sikkim and Nepal; also the stems of some of the tree-ferns, as of *cyathea medullaris* in New Zealand, and *alsophila spinulosa* in India. The young and tender fronds of some F. are occasionally used as pot-herbs in the Highlands of Scotland, Norway, the Himalaya, etc. The fronds are generally mucilaginous, slightly aromatic and astringent. Those of some species of maidenhair (q.v.) are used for making *capillaire;* whilst the bitter and astringent root-stocks of some F. are occasionally used in medicine, as those of the male fern (see FERN, MALE) and the Peruvian *polypodium caliguala*, particularly as anthelmintics. The fronds of a few species are delightfully fragrant.—The cultivation of F. is now in many places successfully conducted on a somewhat extensive scale, both in the open air and in hot-houses; and to such an extent has the occupation of fern-collecting reached, that many excellent

treatises on this subject alone have been written and elaborately illustrated. Amongst others, we may mention *British Ferns* (1s.), published by Routledge, London, as an excellent handbook, while the magnificent nature-printed work, published 2 vols., royal 8vo, by Henry Bradbury, supplies all needful information. Wardian cases, filled with them, have also become common, and are most pleasing ornaments of apartments. The principal species will be noticed under their particular heads.

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tinued in session at Basle, declaring the act of the pope in attempting to transfer it illegal, and pronouncing against him sentence of suspension. To the five delegates, however, who met at Ferrara, others fresh from their homes were added, so that at the second session 72 bishops were present, over whom the pope presided. These were soon joined by the emperor from Constantinople, John Palæologus, who brought with him patriarchs, bishops, and other ecclesiastics, amounting in all to 700 persons. His object in coming was to effect the reunion of the Greek and Latin churches, in the hope that he could thus secure the aid of the west against the Turks, who were then pressing hard upon the empire, and were destined (as afterwards shown) soon to overwhelm it. The points of difference between the churches formed the chief subjects of discussion until the opening of the year 1439, when, on the plea that the plague was prevalent at Ferrara, the sessions were transferred to Florence. (See FLORENCE, COUNCIL OF.)

FERRA'RI, GAUDENZIO, sprung from a family which followed a career of art as if by inheritance, was born at Valdugia, in the Milanese, in 1484. A scholar of Andrea Scotto and Perugino, and the chosen associate and friend of Raphael, his own creations may be said to have caught some inspiration from each of these three great masters, while they also unmistakably reflect genius of a bold, unshackled originality. The chief characteristics of F.'s style are correct and vigorous delineation, extreme vividness and delicacy of coloring, noble grace of form and attitude, and unsurpassable art in the classic disposal of drapery. Being one of the most laborious artists of his day, he has executed innumerable paintings both in *fresco* and in oil, the greater part of which are possessed by the Lombard galleries. His most comprehensive work, the frescos at Barallo, in Piedmont, represents the Passion; the "Martyrdom of St. Catherine," to which he owes his brightest fame, is in the Milanese collection of paintings. He died in 1549, having formed some good scholars, the chief of whom is Andrea Solario.

FER'RATES are combinations of ferric acid (FeO_3), a weak unstable compound of iron and oxygen with bases. See IRON.

FERREI'RA, ANTONIO, one of the classic poets of Portugal, was born at Lisbon, 1528. He was educated at Coimbra, where he occupied himself with the study of the Italian and Latin authors, more especially Horace, whom he almost rivaled in conciseness, but not in elegance of expression. After holding for some time the office of a professor at Coimbra, he obtained a civil appointment of some importance at the court of Lisbon. He carried to perfection the elegiac and epistolary styles, already attempted with success by Sá de Miranda, and transplanted into Portuguese literature the epithalamium, the epigram, ode, and tragedy. His *Ines de Castro* is the second regular tragedy that appeared after the revival of letters in Europe, the first being the *Sophonisba* of Trissino. It is still regarded by the Portuguese as one of the finest monuments of their literature, for its sublime pathos and the perfection of its style. The works of F. are not numerous, as his official duties left him little leisure. He died 1569. All his works are distinguished by soundness and depth of thought. His expression is strong rather than sweet, is extremely animated, and full of that fire which elevates the mind and warms the heart. His efforts after brevity, however, frequently led him to sacrifice harmony to thought. His *Poemas Lusitanos* were first published at Lisbon, 1598, and the *Todas as obras de Ferreira* in 1771. Compare Sismondi's work, *La Littérature du Midi* (Paris, 1813), and Bouterwek's *Geschichte der neuern Poesie und Beredsamkeit* (12 vols. Gött. 1801–19).

FERRET, *Mustela furo*, an animal of the weasel family (*mustelidæ*), so nearly allied to the polecat (q.v.) that may regard it as a mere domesticated variety. It is of rather smaller size, the head and body being about 14 in. long, the tail 5½ in., the muzzle rather longer and more pointed, the head rather narrower; and the color is very different, being yellowish, with more or less of white in some parts, there being two kinds of hair, the longer partly white, the shorter yellow. The eyes are pink. It is, however, much more susceptible of cold than the polecat, and requires careful protection from it in climates where the polecat is a hardy native. It was imported into Europe from Africa, and was well known to the Romans, being anciently employed, as it still is, in catching rabbits, for which purpose it is often sent into their burrows muzzled, or "coped," by means of a piece of string, to drive them out into nets, or, with a string attached to it, it is allowed to seize a rabbit in the burrows, and is then drawn out, holding it fast. The usual plan, however, is to let the F. have free range of rabbit-holes unmuzzled, the rabbits being shot as they bolt. Attention to warmth and cleanliness is essential to the health of ferrets. They are capable only of partial domestication, acquiring a kind of familiarity with man, and submitting with perfect quietness to his handling, but apparently never forming any very decided attachment; and they never cease to be dangerous if not carefully watched, especially where infants are within their reach. If allowed any measure of freedom, they are ready to attack poultry, and kill far more than they can devour, merely sucking the blood. They generally breed twice a year, each brood consisting of six or nine. The female sometimes devours the young ones, in which case another brood is speedily produced.

FERRIC OXIDE, the PEROXIDE, or SESQUIOXIDE OF IRON, Fe_2O_3. The anhydrous peroxide, as found in nature, crystallizes in flattened, rhomboidal tablets, nearly black

and very brilliant, known to mineralogists as "specular iron;" it also occurs in compact red masses, called "red hematite." Prepared artificially, by calcining ferric protosulphate, or copperas, it is a red powder, called colcothar, used as a paint, and for polishing silver and mirrors. Magnetic iron ore is commonly held to be a compound of ferric oxide and ferrous oxide, $Fe_2O_3 + FeO = Fe_3O_4$.

FERRIDCYAN'OGEN is a compound organic radical which has not been isolated, but which forms with potassium a well-known compound used in the arts, called the ferridcyanide of potassium or red prussiate of potash. In the preparation of this salt, a solution of ferrocyanide of potassium is acted on by a stream of chlorine gas until the color of the liquid passes from yellow to deep red, and thereafter, on evaporation and cooling, fine red crystals are obtained. The chlorine (Cl) acts upon two equivalents of the ferrocyanide of potassium (twice $2K,FeC_6N_3 = 4K,Fe_2C_{12}N_6$), removing one equivalent of potassium (K), forming chloride of potassium (KCl), whilst the remaining constituents combine together, and produce one equivalent of ferridcyanide of potassium ($3K,Fe_2C_{12}N_6$, or $3K,Fe_2Cy_6$, or 3K,Fdcy). The latter is known commercially in red crystals, readily soluble in water, and yields a fine deep *Prussian blue* (Turnbull's blue) when mingled with solution of protosulphate of iron (green vitriol), and hence is used largely in dyeing and calico-printing.

FERRIER, JAMES F., LL.D., a metaphysician, was b. in Edinburgh, Nov., 1808. After studying at Oxford, where he took the degree of B.A. in 1832, he was admitted to the Scottish bar in 1833. In 1842, he was elected to the chair of history in the university of Edinburgh, and in 1845, to that of moral philosophy in the university of St. Andrews. Mr. F. early attracted notice by some metaphysical essays, which appeared in *Blackwood's Magazine;* and in 1854 he published the *Institutes of Metaphysics,* in which he endeavors to construct a system of idealism in a series of propositions, demonstrated after the manner of Euclid. He afterwards edited the collected works of his father-in-law, the late prof. John Wilson, of the university of Edinburgh. F. died at St. Andrews, June 11, 1864.

FERRIER, SUSAN EDMONSTON, aunt of the above, a successful novelist, was b. in Edinburgh in 1782, and d. in 1854. Her father, James Ferrier, one of the principal clerks of the court of session, and the colleague in that office of sir Walter Scott, lived on terms of intimacy with the wits and literati of his day in Edinburgh, and Miss F.'s talents and quick powers of observation were early called into play in the midst of the literary society in which her youth was passed. Her first work, *Marriage,* appeared in 1818, and this was followed by *The Inheritance* (1824) and *Destiny* (1831). The merit of these tales, which are characterized by genial wit, a quick sense of the ludicrous, and considerable ability in the delineation of national peculiarities, is sufficiently proved by the fact, that they have stood their ground, notwithstanding the enormous number of works of fiction which have flowed from the press since their publication. Miss F. enjoyed the esteem and friendship of sir Walter Scott, who, in the days of his strength, repeatedly gave expression to his appreciation of her talents, and who derived consolation from her sympathy in the season of gloom which darkened the close of his life.

FERRO, or HIERRO, the most western of the Canary isles, was formerly considered the most westerly point of the old world, and for this reason geographers at one time took it as the point of departure in reckoning longitudes, as is still done by the Germans and others. Hence, in all probability, originated the present hemispherical division of the maps of the world, F. being taken as the boundary-line. The English, however, have adopted the meridian of Greenwich as the first meridian, and in this their example is followed by the Dutch, and in sea-charts generally; area, 82 sq.m.; pop. 4,400. The meridian of F. is 18° 9′ w. of that of Greenwich. See LONGITUDE.

FERROCYAN'OGEN is a compound organic radical, generally regarded by chemists as existing in ferrocyanide of potassium, or the yellow prussiate of potash, but which has not yet been obtained in a separate state. The principal compound of F. is the ferrocyanide of potassium, which is prepared by heating to redness in a covered iron pot a mixture of 3 parts by weight of nitrogenized matter, such as dried blood, hoofs, parings of hides, scrapings of horn, or the flesh of old or diseased horses and other animals, 3 parts of carbonate of potash, and 1 part of iron filings. The carbon, nitrogen, and iron combine together, and form F. ($FeC_6N_3 = FeCy_3$, or Cfy), which, at the same time, unites with the potassium, and produces ferrocyanide of potassium, or yellow prussiate of potash (2K,Cfy). The compound which is obtained from the heated iron vessel is impure, but by repeated solutions in hot water, and recrystallization on cooling, the salt is obtained pure in fine large tabular crystals of a lemon-yellow color. The ferrocyanide of potassium is largely used in dyeing and calico-printing (q.v.), in the production of many shades of *Prussian blue;* and when it is treated with sulphuric acid, and subjected to heat applied, hydrocyanic or prussic acid ($HC_2N = HCy$) distills off from the mixture. The ferrocyanide of potassium is characterized by giving no indication of the presence of iron in its radical on the application of any of the tests for iron. It gives a light-blue precipitate on the addition of a solution of pro-

tosulphate of iron; a dark-blue precipitate with perchloride of iron; a ruddy brown precipitate with sulphate of copper; and a white precipitate with acetate of lead.

FERROL, a strongly fortified seaport of Spain, in Galicia, is most advantageously situated on a narrow arm of the sea, 14 m. n.e. of the town of Corunna. It was originally a fishing-town, until selected for its natural advantages as a seaport by Charles III., who erected here what was at one time the finest naval arsenal in the world, and destined it exclusively for the Spanish royal navy. The entrance to the harbor, formed by a narrow inlet from the bay of Betanzos, admits of the approach of only one ship-of-the-line at a time, and is defended by the castles of San Felipe and Palma. The town is defended by walls and fortifications, is, on the whole, regularly built, and has several squares and pleasing alamedas or public walks. The arsenal, in which fifteen ships-of-the-line could be simultaneously built, covers a great space; and though now in a somewhat ruinous condition, is still the most important in Spain. F. has manufactures of hats, naval stores, hardwares; and exports corn, brandy, vinegar, and fish. Pop. (including the garrison) 16,640.

FERROTYPE, a term applied by Mr. Robert Hunt, the discoverer, to designate some photographic processes, in which salts of iron play an important part. Like many of the earlier paper processes, the F. is far inferior in sensibility to the more modern collodion process or Archerotype, and is on that account seldom if ever used even for landscapes.

FERRUGINOUS is a term employed in chemistry to denote the presence of iron in natural waters, minerals, etc. It is synonymous with the term chalybeate. See CHALYBEATE WATERS.

FERRY (from Sax. *faran*, Ger. *Fahren*, to move, proceed, allied to the Lat. *fero*, Eng. *bear*), a passage by boat across water. By the law of England, a man may have a right to keep a boat and to ferry passengers for a consideration, just as he may have a right to hold a fair, either by royal grant, or by prescription, from which a royal grant at some previous time will be presumed. No other title, unless conferred by act of parliament, will suffice, for no fair, market, or F. can be set up without license from the crown either actual or presumed. The possessor of such a title need not necessarily be the proprietor of the soil on which the market is held, or of the water over which the right of F. is exercised. In the latter case, he need not be the proprietor of the soil on either side of the river, though he must possess such rights over it as will enable him to embark and disembark his passengers. As fulfilling his part of the bargain with the public, the owner of a F. is bound to keep a boat fit for the purpose of carrying passengers, whilst on the other hand he has a right of action not only against those who refuse or evade payment of the toll or passage money, but against those who disturb his franchise by setting up a new F. so near as to diminish his custom.—Stephen, i. pp. 663, 664. It has been more than once decided, that, the erection of a second F. in such circumstances is a nuisance to the owner of the old one, who is bound to keep his F. in readiness for the use of the queen's subjects, a burden which is not shared by his rival (North and South Shields Ferry Co. *v.* Barker, 2 Exch. 136). The rule in Scotland as to rival ferries is the same; but a grant of F. from the crown to one heritor does not prevent his neighbors from keeping private boats for the transport of themselves and their families and servants. Where ferries have not been given out by royal gift, either express or presumed as above described, they are *inter regalia*, i.e., they belong to the crown for the public benefit. In this case, they are under the management of the trustees of the roads connected with them, or are regulated by the justices of the peace for the county, or by special acts of parliament. By 8 and 9 Vict. c. 41, certain rules are laid down for the regulation of ferries. The act is confined to Scotland.

Common rowing-boats are generally used for ferrying foot-passengers, but when horses and carriages have to be taken across, a flat-bottomed barge, with an inclined plane at one end, to rest upon the shore, for landing and embarking, is generally used. This is either rowed across or pulled by a rope. When the current is strong, and the river of moderate width, the latter is best. The rope stretched across the river passes through rings or over pulleys attached to the barge, and the ferrymen move the barge across by pulling the rope. The chief advantage of the rope is to restrain the barge from drifting in the direction of the stream. With a small boat, this is obviated by the ferryman rowing obliquely, as though he were steering for a point higher up the river; thus he moves through the water upwards to the same extent that the water moves over the land downwards; and by a composition of these motions, and his tending to the other side, is carried directly across. Broad estuaries are now traversed in many places by steam-ferry.

Rafts are sometimes used for ferrying. On the Nile, a sort of raft is made of inverted earthen-pots full of air. For further information on the crossing of rivers, see FORD, FORDING.

Flying-bridge is the name given to a kind of ferry-boat which is moved across a river by the action of the combined forces of the stream and the resistance of a long rope or chain made fast to a fixed buoy in the middle of the river. The boat thus attached is made to take an oblique position by means of the rudder; the stream then acting against

the side, tends to move it in a direction at right angles to its length, while the rope exerts a force in the direction towards the buoy. If these two forces be represented by the sides of a parallelogram, the actual course of the boat would be in the direction of the diagonal (see COMPOSITION AND RESOLUTION OF FORCES); but as the length of the rope remains the same, the boat must continue always at the same distance from the buoy, and therefore its course is a curve, a portion of a circle, of which the buoy is the center, and the rope the radius. The course of the boat and the action of the two forces are strictly analogous to the path of a rising kite, and to the forces of which this path is the resultant. The holder of the kite corresponds to the buoy, the wind to the tidal stream, and the tail to the rudder. Flying-bridges are used for military purposes, and the modes of adapting them to the varying circumstances of the width of rivers and the velocity of their currents, forms a part of the study of military engineering. An important element in the problem, is the determination of the right point of attachment for the rope. In the case of a wide river, the rope or chain requires to be of considerable length, and must be supported by movable buoys or by small boats.

FERRY (*ante*), in the United States, usually an important and valuable property, owned or assumed by the local governments, and regulated by laws. The city of New York holds the right to control ferries from the English colonial charter, and no ferry can be started to or from the island on which the city stands without consent of the corporation. But usually one state has the right to establish a ferry over a navigable river separating it from another state, although its jurisdiction may not extend beyond the middle of the stream. In the case of New York city, the corporate rights extend to low-water mark on the opposite shores, and therefore the city practically controls all ferries. Ferry franchises are commonly protected by their express terms from infringement or rivalry. The franchise of a ferry is an incorporate hereditament, is subject to dower, may descend to heirs, may be leased, sold, and assigned; but inasmuch as the people have an interest in it, it is subject to legislative regulations for the protection and enforcement of public rights. Controllers of ferries and carriers are subject to all laws affecting such public servants, with respect not only to care of property, but also to safety of life. Tenants or lessees of ferries are owners in law in case of injury.

FERSEN, AXEL, Count, 1755–1810; marshal of Sweden, son of count Axel, a state senator; educated by his father, and in the Turin military academy. He was aide to Rochambeau in the American revolution, and was present at the surrender of Yorktown. Returning to France at the time of the French revolution, he became a warm friend of the royal family. When they fled from Paris he disguised himself and acted as their coachman, conducting them as far as Bondi, whence they were sent on under other care. After the failure of the scheme and the imprisonment of the royal family, he exerted himself in every way for their comfort. After their execution he returned to Sweden, and became chancellor of Upsala university. Not long after, he was plenipotentiary to the Rastadt congress. When the crown-prince of Sweden suddenly died in June, 1810, Fersen and his sister were suspected of procuring his death by poison. At the funeral they were attacked by the mob, and he was slain, the sister escaping. Their complete innocence was afterwards satisfactorily proved.

FERTILIZATION OF PLANTS. See FECUNDATION.

FERTILIZERS. See GUANO, MANURES, PHOSPHATES, *ante*.

FESA, or FASA, a t. of Persia, in the province of Fars, 80 m. s.e. of Shiraz, is situated in a mountain defile, is of considerable size, and is said to have a pop. of 18,000. It has manufactures of silken, woolen, and cotton fabrics, and some trade in a superior kind of tobacco which is grown in the vicinity.

FESCENNINE VERSES, a branch of the indigenous poetry of ancient Italy, were a sort of dialogues in rude extempore verses, generally in Saturnine measure, in which the parties rallied and ridiculed one another. It formed a favorite amusement of the country-people on festive occasions, especially at the conclusion of harvest and at weddings. As was to be expected, it often degenerated into licentiousness, that at last required the curb of the law. The F. V. are usually considered to be of Etruscan origin, and to have derived their name from the Etrurian town Fescennium; but there is little probability in this etymology. Verses of this sort were and are popular to this day all over Italy. The name is more likely connected with *fascinum*, fascination, enchantment, or the evil eye, against which the chanting of verses may have originally been intended as a protection.

FESCH, JOSEPH, Cardinal and archbishop of Lyons, was b. 3d Jan., 1763, at Ajaccio. His father, a Swiss officer in the service of Genoa, had married a widow, whose daughter by a former husband, Letizia or Lætitia Ramolino, became the mother of Napoleon Bonaparte. F. was thus the half-brother of Letizia, and the uncle of the future emperor. He had entered the clerical profession, but left it at the outbreak of the French revolution, and, in 1795, became commissary to the army of the Alps under his nephew in Italy. The first consul having resolved on the restoration of the Catholic worship, F. resumed the clerical habit, and was active in bringing about the concordat with pope Pius VII. in 1801. He was now (1802) raised to be archbishop of Lyons, and in the following year to be cardinal. In 1804, he was sent as French ambassador to Rome,

where he ingratiated himself with the pope by his adroit management and ultramontane sentiments, and contributed to induce the pope to undertake his mission to Paris to consecrate Napoleon as emperor. F. accompanied the pope, and assisted at the coronation; and for his services at Rome, he was rewarded by the office of grand almoner and a seat in the senate. In 1806, the archbishop of Regensburg, arch-chancellor and first prince elector of the just expiring German empire, and about to become the prince primate of the nascent confederation of the Rhine, chose F. to be his coadjutor and successor; and, along with all these dignities, he received a stipend of 150,000 florins a year. In 1809, Napoleon wished to invest him with the archbishopric of Paris, but F. declined it, as he had long been dissatisfied with the emperor's policy in regard to the papal chair. In 1810, he presided at a national conference of clergy assembled at Paris, and the views which he maintained there, with even more than usual keenness, brought him into disgrace with the emperor, who was still further exasperated against him on account of a letter which F. wrote to the pope, then (1812) in captivity at Fontainebleau, and which was intercepted. He lost his imperial dignities and pension, and the prospects of the primacy of the Rhine confederation were also taken away by the appointment of prince Eugene to be grand duke of Frankfort. After this, F. lived in a sort of banishment at his bishopric of Lyons. At the approach of the Austrians in 1814, he fled to Rome with his stster Letizia, the mother of the emperor, where he was received with open arms by the pope. The return of Napoleon brought him back of France, and during the hundred days, he was nominated a member of the chamber of peers, though he never took his seat; but, after the battle of Waterloo, he had again to take refuge in Italy. The royalist clergy now persecuted him with accusations and lampoons which he in no way deserved. His resistance to the will of his nephew, and indeed his whole conduct, seem to have been actuated by sincere zeal for what he considered to be the interests of the church. When called upon by the Bourbons to resign his episcopal office, he obstinately refused; and it was not till 1825, after receiving a papal brief interdicting the exercise of his clerical functions, that he resigned the charge, but not the title. In 1837, an attempt was made to reinstate him, to which, however, the French government refused assent. He lived in the greatest friendship with his sister, Madame Mère, as she was styled, till his death. He died 13th May, 1839. Of his famous and very large collection of paintings, he bequeathed a part to the city of Lyons, and the rest was disposed of in a series of auctions at Rome after his death.

FESCUE, *Festuca*, a genus of grasses, very nearly allied to brome-grass (q.v.), and having in some species a loose, in some a contracted panicle; the spikelets many-flowered, with two unequal glumes, which they much exceed in length; each floret having two lanceolate paleæ, the outer palea rounded at the back, and acuminate or awned at the summit; the stigmas growing from the apex of the germen. The species are numerous, and are very widely diffused over the world, both in the northern and southern hemispheres. Among them are many of the most valuable pasture and fodder grasses. None are more valuable than some of the British species.—MEADOW F. (*F. pratensis*), a species with spreading panicle and linear spikelets, from 2 to 3 ft. high, common in most meadows and pastures of rich soil, in Britain and throughout Europe, in northern Asia, and in some parts of North America, is perhaps excelled by no meadow or pasture grass whatever. It is suitable both for alternate husbandry and for permanent pasture.—SPIKED F. (*F. loliacea*)—by many botanists regarded as a variety of meadow F., although it departs from the habit of the genus in having the branches of the panicle reduced to a single spikelet, and forming a two-rowed raceme or spike—is regarded as an excellent grass for rich moist meadows.—HARD F. (*F. duriuscula*), a grass from one foot and a half to 2 ft. high, with a somewhat contracted panicle, mostly on one side, is one of the best grasses for lawns and sheep-pastures, particularly on dry or sandy soils. Several varieties are known to seedsmen and farmers.—CREEPING F. or RED F. (*F. rubra*) is probably a mere variety of hard F., being distinguished chiefly by its extensively creeping root, which particularly adapt it to sandy pastures, and to places liable to occasional inundations.—SHEEP'S F. (*F. ovina*) is a smaller grass than any of these, not generally exceeding a foot in height, and often much less, abundant in mountainous pastures, and especially suitable for such situations, in which it often forms a principal part of the food of sheep for many months of the year. It is common in all the mountainous parts of Europe, and in the Himalaya; it is also a native of North America, and species very similar, if not mere varieties, abound in the southern hemisphere. Its habit of growth is much tufted.—TALL F. (*F. elatior*) is a grass of very different appearance, 4 or 5 ft. high, with spreading much branched panicle, growing chiefly near rivers and in moist low grounds, and yielding a great quantity of coarse herbage, which, however, is relished by cattle.—Of foreign species, which have been introduced into Britain, *F. heterophylla* best deserves notice, a tall species with narrow root-leaves, and broad leaves on the culm; a native of France and other parts of the continent of Europe, and pretty extensively cultivated in some countries, particularly the Netherlands.—All these species are perennial.—Some small annual species occasionally form a considerable part of the pasture in dry sandy soils, but are never sown by the farmer.—A Peruvian species (*F. quadridentata*), called *pigouil* in its native country, and there used for thatch, is said to be poisonous to cattle.

FESS. The F. in heraldry consists of lines drawn horizontally across the shield, and containing the third part of it, between the honor point and the nombril. It is one of the honorable ordinaries, and is supposed to represent the waist-belt or girdle of honor, which was one of the insignia of knighthood.

PER FESS.—A shield, or charge in a shield, is said to be *party per fess*, when it is horizontally divided through the middle, or, as the French say, simply *coupé*.

FESSWISE is said of a charge placed *in* F.; that is to say, horizontally across the shield.

FESSENDEN, FRANCIS, b. Maine, 1839; graduated at Bowdoin, and studied law. In 1861, he was appointed capt. of infantry; was wounded at Shiloh, became col. of volunteers, and commanded a brigade at Chantilly, and at other places. He received a number of promotions, and in 1866 was appointed lieut.col. of the 28th U. S. infantry.

FESSENDEN, THOMAS GREEN, 1771–1837; b. N. H.; graduated at Dartmouth in 1796; studied law, and occupied his leisure hours in writing humorous and sarcastic verses for a newspaper edited by Joseph Dennie. In 1803, he published in London, anonymously, *Terrible Tractoration*, a satire upon the medical profession, and especially upon the then famous metallic tractors of Dr. Perkins. The work was enlarged, and reached a third edition. In 1822, he started the *New England Farmer*, with which he was connected until his death. Among his works are *Democracy Unveiled; American Clerks' Companion; The Ladies' Monitor; Laws of Patents for New Inventions.* For two years he edited the *Weekly Inspector* in New York city.

FESSENDEN, WILLIAM PITT, LL.D., 1806–69; b. N. H.; graduated at Bowdoin in 1823; admitted to the bar in 1827, and soon afterward made his home in Portland, Me. He was a member of the state legislature in 1832; of congress in 1841; and of the U. S. senate in 1853. Being rechosen in 1859, he was appointed chairman of the finance committee, and throughout the war of the rebellion rendered valuable service by aiding the secretary of the treasury to maintain the national credit, as well as by his counsel in the senate chamber. In 1864, on the retirement of Mr. Chase from the secretaryship of the treasury, he accepted that portfolio, and discharged the duties of the office during a most critical period of the nation's finances, until Mar., 1865, when, owing to failing health, he resigned, and resumed his seat in the senate, to which he had been re-elected. He began his career as an ardent whig; was a member of the whig national conventions of 1840 and 1848, in the latter advocating the nomination of Webster; but in the convention of 1852, he opposed Webster, and favored Scott. He was one of the founders of the republican party, in which he became a prominent leader.

FESSLER, IGNAZ. AURELIUS, a celebrated Hungarian historian, was b. in 1756, in the co. of Soprony or Oedenburg. During a long life full of adventures, F. served successively the emperor Joseph II., the king of Prussia, and the emperor of Russia; and also held the office of professor of oriental languages at different universities. He died at St. Petersburg, 15th Dec., 1839. Among his works of a lasting value are *Attila* (Breslau, 1794), *Mathias Corvinus* (2 vols. 1793; 2d edition, 1806, Breslau), and the History of the Hungarians, etc. (*Geschichte der Ungarn und deren Landsassen*, 10 vols. Leip. 1812–25). His autobiography, entitled Recollections of my 70 Years' Pilgrimage (*Rückblicke auf meine 70 jährige Pilgerschaft*, Breslau, 1826; 2d edit. Leip. 1851), is also a very interesting work. Deep learning, coupled with a rare beauty of style, render F.'s works (all written in German) attractive in the highest degree.

FESTIVAL PLAYS. See MORALITIES, MIRACLE PLAYS, MYSTERIES.

FESTIVALS, or FEASTS (Lat. *festum*, probably from the same root as *fast* (q.v.); according to some, from Gr. *hestia*, hearth), a term denoting certain periodically recurring days and seasons set aside by a community for rest from the ordinary labor of life, and more or less hallowed by religious solemnities. Originating within the narrow circle of the family, and commemorating momentous events affecting one member or all, these pauses became more frequent, and of wider scope, as the house gradually expanded into a tribe, a people, a state. The real or imaginary founders, legislators, heroes, became objects of veneration and deification, and the salient epochs of their lives the consecrated epochs of the year. National calamities or triumphs were, in the absence of annals, best remembered by corresponding general days of humiliation or exultation. Earliest of all, however, did the marked stages in the onward march of nature; spring and autumn, seed-time and harvest-time—symbols of life and death; the solstices—turning-points of summer and winter; the new moon and the full moon; the termination of cycles of moons and cycles of years, present themselves as opportune halting-places for man himself. No less were the all-important periodical rises of fertilizing rivers, and the anniversaries of importations and inventions of new implements for the better cultivation of the soil, or tending of the flocks, befittingly celebrated. The inherent human tendency towards referring all things of graver import, life and death, abundance and want, victory and defeat, to a higher power, could not but infuse a religious feeling into epochs so marked. Fostered and guided by priests and lawgivers, this property of our nature erelong found its expression in common sacrifices, prayers, and ceremonies, consecrated to the various superior and minor deities who presided over

and inhabited the elements of the visible and invisible creation, and who, working all the changes within them, acted, each in his sphere, as a partial providence over man. According to the event which called them forth, these F. were mournful or joyous, jubilant or expiatory. Even when sorrow was to be expressed, the mortification of the body did not always suffice, but plays, songs, dances, and processions full of boisterous mirth, were resorted to—as in the F. of Isis at Busiris, of Mars at Papremis, in the Adonia of Egypt, Phenicia, and Greece—because the divine wrath or sorrow was, like that of man, to be changed into satisfaction. Besides the relation between the common tutelary deity and those he protected, the bond also by which the otherwise disconnected members of the body-politic were held together was, by means of these festive gatherings, periodically brought in view, and invested with greater strength and importance. Apart, however, from this their historical, astronomical, religious, and political end, F. served another purpose—that of growing civilization. It was the glowing spirit of emulation which, stimulating the gifted in mind and body to strive for the festive laurel in contests of genius and skill, in honor of the gods, and in the face of all the people, matured all that was noble and brilliant within the community. Archaic rudeness and rustic extravagance became refined grace and classic harmony. The stirring drama, the glorious anthem, the melodious dance, the elegant game, which accompanied the festive sacrifice of some nations at their highest stage of development, had arisen out of those very mimicries and shouts, rude and savage beyond expression, of generations not long before them. Enthusiastic, wild, metaphysical Egypt invested the countless days consecrated to her deified stars, plants, animals, and ideas; to the Nile, to Ammon, Kneph, Menes, Osiris; to Horus, to Neitha, to Ptah, with a mystery, sensuality, and mournfulness always exaggerated, sometimes monstrous. The Hindu, no longer daring to offer human sacrifices, shows his odd and cruel materialism by throwing into the waves, on his festival of rivers, some of his costliest goods, gold, jewels, garments, and instruments; while in the licentiousness and debaucheries perpetrated on the festival of Shiva, the god of procreation, or on the Bacchantics of the goddess Bhavani, he exceeds even those of the Egyptians on their Neitha feasts at Bubastis, and the Greek worship of Venus in her Cyprian groves. Phenicians and Assyrians, Babylonians and Phrygians, according to the little we know of their religions and manners, appear to have feasted, thanked, propitated, mourned all at different times, and in the way most befitting their several natures, even in the case of those gods and F. which they had in common.

The ancient Persians alone of all nations had no F., as they had no temples and no common worship, These "Puritans of Polytheism," who worshiped the sun only, and his representative on earth, fire, scorned show and pomp, and large religious gatherings. A striking contrast to them is formed, in another hemisphere, by the ancient Mexicans, who were found to possess one of the most richly developed calendars of F., scientifically divided into movable and immovable feasts. As a strange and singular phenomenon among F., we may also mention here that "of the Dead or Souls," celebrated among the wild tribes of North America. At a certain time, all the graves are emptied, and the remains of the bodies buried since the last festival are taken out by the relatives, and thrown together into a large common mound, amid great rejoicings and solemnities, to which all the neighboring tribes are invited.

Greece had received the types of civilization, religion, and art from Egypt and the east generally, but she developed them all in a manner befitting her glorious clime and the joyous genius of her sons. At the time of the *Iliad*, two principal festivals only—the harvest and the vintage—seem to have been celebrated (ix. 250); but they increased with such rapidity, that in the days of Pericles they had reached the number of a thousand; some indeed being an epitome only of their memorable feats of arms, others restricted to one town, or province, or profession, or sex, or to a few initiated, or recurring only at intervals of several years; but there were still so many kept by the whole people that ancient writers bitterly denounce them as merry beginnings of a sad end, as the slow but sure ruin of the commonwealth. Their forebodings proved true enough; and yet Greece would certainly never have reached the highest place among nations, as far as literature, the arts, and philosophy are concerned, had it not been for the constant contests attached to her many festivals. She resisted Asia, because her citizens were always alert, always ready. The religious part of the festival—homage offered to personified ideas—consisted mostly in the carrying about of the deity of the day to the sound of flute, lyre, and hymns, and in a sacrifice, followed by a general meal upon certain portions of the animal offered. Then followed scenic representations symbolizing the deeds of the gods; after which came games and matches of all kinds—foot, horse, and chariot races, leaping, boxing, throwing, wrestling, etc. Separate accounts are given of some of the more remarkable Greek festivals. See BACCHUS, ELEUSINIAN MYSTERIES, PANATHENÆA, etc. There were also special times set aside for the "holy games" proper. The most important of these were the Olympian, the Pythian, the Nemean, and the Isthmian. (See these heads.) As all these festivities were provided out of the public purse—from the confiscated estates of the "tyrants" and political delinquents—the individual did not suffer more than a welcome interruption of his usual business, and under that genial sky the penalty to be paid for occasional indolence was not too heavy.

Rome, founded amid pastoral festivities in honor of some god Pales, adopted and acclimatized, as she went on from conquest to conquest, the foreign deities, exactly as, with her usual prudence and practical sense, she conferred her right of citizenship on her foreign inhabitants, and on whole nations subjected to her rule. Her yoke was thus less galling to the new provinces, while at the same time the populace at home found sufficient distraction in the many ancient and newly imported F., with their quaint rites and gorgeous pageantry. Yet the Romans—more parsimonious and abstract by nature than the vivacious Greek neighbors from whom they had accepted the greatest part of their religion—never exceeded in their F. the number of one hundred, and in these, again, a distinct line was drawn between civil and religious ones. Some of the principal religious F. were the Sementinæ, on the 25th of Jan.—the rural festival of the seed-time; the Lupercalia, in honor of Pan; the Cerealia; the night festival of the Bona Dea; Matronalia; Minervalia, etc. To the purely civil ones belong the Janualia, the 1st of Jan. and the new-year's day, when the new consuls entered upon their office, and friends used to send presents (*strenæ*) to each other; the Quirinalia, in memory of Romulus, deified under the name of Quirinus; and the Saturnalia, in remembrance of the golden age of Saturn, beginning on the 19th of Dec. The celebration of these F. was in all respects imitated from the Greeks, with this difference only, that the games connected with them became, with the pre-eminently bellicose Romans, terribly life-like images of war. Their sham sea-fights; their pitched battles between horse and foot, between wild beasts and men; their so-called Trojan games, executed by the flower of the nobility; their boxing-matches (with gloves that had lead and iron sewed into them): circus, arena, and amphitheater gave, especially in later times, the greater satisfaction the greater the number of victims.

It is one thing only that monotheism has in common with polytheism with respect to its F.—namely, that they are with each the religious expression of human joy or human sorrow. But if the former, with a dim misgiving of some awful and supreme power, invited the multifarious governors of the many provinces of nature to partake, as guests, of bodily and intellectual feasts, *together* with their hosts; monotheism, in binding up all fear and all hope, all gratitude and all awe, which moved the heart of man, in one almighty Creator, Mover, and Maintainer of all things, celebrated its F. in honor of this omnipresent Spirit with a veneration, a purity, and a lofty elevation, such as the worshipers of star, animal, or image never knew. With the first and strictest monotheists, the Hebrews, whose very existence as a nation was traced to the special and miraculous interference of this highest and only God, the remembrance of that great event, their liberation from Egypt, and the momentous period of preparation in the desert which followed it, mingled with almost all their religious observances, and especially their F., and infused into them all a tone of deep and fervent gratitude; while at the same time it held ever before their eyes the cause of their nationality, and their aim and destiny "to be a kingdom of priests and a holy people." The Hebrew F., too, are of a historical, agricultural, astronomical, and political nature; but they mostly combine all these characteristics, and are always hallowed by the same religious idea, and the same piety and devotion to one and the same holy name. Connected with their F. were no plays and no representations of a god's deeds, no games and no cruelty, no mystery and no sensuality, but the sacrifice of the day, and a special occupation with the divine law, were the visible signs of the exalted seasons. The influence of the number seven—an influence met with among most eastern nations—is seen in the recurrence of many of the Jewish solemnities. See SEVEN. The Sabbath, the first and most important of these septenary festivals, is treated of under its own head. Of the service in the temple, and of the way in which this and the other F. were and are kept after the destruction of the temple, something will be said under HEBREWS and JEWS. The most exalted of new-moon F. was that of the first day of the seventh month, "the day of remembrance of the sounding," or "of trumpets" (Lev. xxiii. 24), to which, in later times, when the Seleucidan era was introduced (the Syrian year beginning with the autumnal equinox), the name of Rosh hashana (New Year) was given; notwithstanding that in Exodus (xii. 2) Nisan is spoken of as the first month of the year. After a period of six years of labor, the earth, too, was to celebrate a Sabbath-year; what it produced spontaneously belonged to the poor, the stranger, and to animals. It is remarkable that even Alexander the great and Cæsar remitted the taxes of Judea in this year of *Shemitta* (abandoning). After a revolution of seven times seven years, the year of Jubilee, or Jobel, was to be celebrated, in which all the Hebrew slaves were set free, and all land which had been sold in the interval was restored to the former owners, in order that the original equilibrium in the families and tribes should be maintained intact. (These two F., however, were, according to the Talmud, not kept before the Babylonian captivity.) The preeminently agronomical and historical F. were the three *Chuggim* (whence the Arab. *Hagg*, a pilgrim to Mecca)—viz., Pesach (Passover), Schabuoth (Feast of Weeks), and Succoth (Feast of Tabernacles), on which three every male was obliged to go up to Jerusalem and offer some of the first fruits, besides the prescribed sacrifices (see PASSOVER, etc.).

The postmosaic and exclusively historical F., Purim, the feast of Haman, Chanuca, the feast of the Maccabees, will be noticed in the article on JEWS.

Only a cursory glance can be here taken of the Christian F., which are treated fully

and separately under their various names. They were for the most part grafted, in the course of time, upon the Jewish and pagan ones, but always with a distinct reference to Christ and other holy personages. The weekly day of rest was transferred from Saturday to Sunday, and called the Day of Joy, or Resurrection, just as the weekly Jewish fasts of Monday and Thursday were changed for Wednesday and Friday. See FASTS. For a long time, both Saturday and Sunday were celebrated, especially in the east. Two separate celebrations took the place of the Jewish Passover: the *Pascha Staurosimon* was the festival of the death, the *Pascha Anastasimon* of the resurrection of our Lord (see EASTER); and the festival of Pentecost, or the law-giving at Sinai, became the festival of the outpouring of the Holy Ghost, and of the inauguration of the New Covenant.

In the course of the 4th c., two new F. were introduced: Epiphany (q.v.), which originated in the east; and that of the Nativity or Christmas (q.v.). Circumcision, Corpus Domini, the F. of the Cross, of Transfiguration, of the Trinity, and many others, are of still later date. The veneration felt for Mary as the "mother of God," found its expression likewise in the consecration of many days to her special service and worship; such as that of her presentation, annunciation (Lady's Day), assumption, visitation, immaculate conception (q.v.), and many minor F., over and above the Saturdays, which, in some parts, were entirely dedicated to her, in order that the mother might have her weekly day like the Son. Besides these, there were F. of angels, of apostles, saints, martyrs (on the supposed anniversary of their death, called their birthday, *dies natalis*), of souls, ordinations, etc.

Celebrated at first with all the primitive simplicity of genuine piety, most of these F. were ere long invested with such pomp and splendor that they surpassed those of the ancient Greeks and Romans. Burlesque, even coarse and profane representations, processions, mysteries, and night-services, were, in some places, although unauthorized by the general church, connected with them, and voices within the church loudly denounced these "pagan practices." Ordinances forbidding mundane music and female singers for divine service were issued, the vigils were transformed into fasts, days of abstinence and penance were instituted, partly as counterpoises, but with little result. Nor did the prodigious increase of these festive occasions, and the rigor with which abstinence from labor was enforced in most cases, fail to produce the natural results of indolence and licentiousness among the large mass of the people. Bitter and frequent were the complaints throughout Christendom; but although even men like archbishop Simon of Canterbury (1332), Petrus de Alliaco, Nicolaus of Clemangis, did their utmost to obtain a reduction of these festive occasions, which overspread well-nigh the whole year, it was only after the most decided and threatening demands, such as that pronounced by the German diet of Nürnberg in 1522, that pope Urban was prevailed upon to reduce the number for Catholic Christianity (1642). Benedict XIV. (1742), Clement XIV. (1773), followed in the same direction. On the change produced both in their number and in the manner of their celebration through the reformation, we must forbear to enlarge here.

The Christian F. have been divided variously: into *feriæ statutæ* (returning annually at fixed times), *indictæ* (extraordinary, specially proclaimed), *duplicia* (double reminiscence, or of higher importance), *semiduplicia* (half double), etc. Another division is into weekly and yearly feasts, these latter being subdivided into greater and minor, or into movable and immovable. There is also a distinction made between *integri* (whole days), *intercisi* (half-days), etc.

The only trace of the ancient manner of dating a festival from the eve or vesper of the previous day—a practice discontinued since the 12th c., when the old Roman way of counting the day from midnight to midnight was reintroduced—survives in the "ringing in" of certain days of special solemnity on the night before, and in the fasts of the vigils.

On some of the principal Mohammedan F., partly based upon those of the Jews and Christians, such as the weekly Friday, the Yom Ashoora (the Jewish day of atonement), the birthday of the prophet (Molid An-Nebee), that of Hussein, of Mohammed's granddaughter Zeyneb, of the night of the prophet's ascension to heaven (Leylet Al-Mearag), the night of the middle of the month Shaabán, in which the fate of every man is confirmed for the ensuing year; the Eed Al-Shagheer or Ramadan-Beyram, at the end of the Ramadan fasts, and the Eed Al-Kabir, or the great festival of the sacrifice (Kurban Beyram), see MOHAMMEDANISM. For further information, see Herodotus (ii. 60); Plutarch (vii.); Strabo (vi. and x); Ovid, *Fasti;* Macrobius, *Sat.* i. 7, 11; Meursius, *Græcia Feriata;* Meiners, *Geschichte d. Relig.;* Fasold, *Ierologia;* Bible; Mishna; Gemara; Shulchan Aruch; Josephus; Philo; Maimonides; Buxtorf, *Lex. Talm.; Synag. Jud.;* Bartolocci, *Bibl. Rabb.;* Lightfoot, *Hor. Hebr. and Talm.;* Lund, *Bibl. Hebr.;* Wette, *Archæologie;* Neander, *Hist. of the Ch.;* Blackmore, *Christ. Antiq.;* Baumgarten, *Erläuterung d. chr. Alterth.;* Siegel, *Handb. d. chr. Alterth.;* Mai, *Discorsi di Argomento Religioso;* Koran, etc.

FESTOON, in architecture, a sculptured wreath of flowers or fruit, frequently used as an ornament in Roman and renaissance buildings. Like many of the other ornaments of classic architecture, it owes its origin to one of the sacrificial emblems, viz.,

the flowers with which the heads of the animals, the altars, etc., used to be decorated. The F. occurs along with bulls' heads on the frieze of the temple of Vesta at Tivoli.

FESTUS PORTIUS, successor of Felix as procurator of Judea; sent there by Nero about 60 A.D. It was he who heard the case of the apostle Paul, whom Felix had left prisoner, and but for the fact that Paul had already appealed to Rome he would have set the apostle free. He had some difficulties with the Jews, but none of great importance. Josephus gives him the character of a just and vigilant magistrate.

FESTUS, SEXTUS POMPEIUS, a Latin lexicographer of the 3d or 4th c. of our era, is one of the most important ancient authorities we have on the Latin language. He made an epitome of the great work of Verrius Flaccus, *De Verborum Significatione.* This compilation, which was arranged alphabetically in 20 books, was still further abridged and spoiled in the end of the 8th c. by Paul, son of Warnefried, commonly called Paulus Diaconus. The great work of Flaccus has unfortunately entirely perished, and of the abridgment made by F., only a single MS., and that in a deplorably imperfect condition, has survived. It came from Illyria, and fell into the hands of Pomponius Lætus, a distinguished scholar of the 15th century. It ultimately passed into the library of cardinal Farnese, at Parma, and is now preserved at Naples. The work, in spite of all its imperfections, is a grand storehouse of knowledge on points of mythology, grammar, and antiquities. All previous editions of F. are of little value compared with that of K. O. Müller (Gött. 1839), in which he has made use of the Farnese MS. and other sources, distinguishing the value of each.

FE'TIALES, or FECIALES, Roman officers who acted in international affairs as heralds in the announcement of war to a foreign state, and by presiding over the solemnities attending the return of peace. Their duties were discharged with much ceremony. They were anciently citizens of high birth, were chosen for life, and were called *patres patrati.*

FETICHISM is the worship of a *fetich.* The word fetich comes to us from the Portuguese, who were the first Europeans that traded on the w. coast of Africa, and who expressed their idea of the religion of the natives by the Portuguese word *feitiçao,* "magic." This word, somewhat modified, passed into the French language, through Brosse's treatise, *Du Culte des Dieux Fétiches* (Dijon, 1760), and from him into German, through the medium of Pistorius (Stralsund, 1785). The term has now received European recognition. A fetich is anything in nature or art to which a magical power is ascribed, e.g., stones, carved figures, or certain parts of plants, animals, etc. In this general sense F. coincides with the belief in charms—a belief which is also to be found among monotheistic nations. The first step *out of fetichism,* is when ignorant tribes cease to be satisfied with believing merely in the magical power inherent in their fetiches, and begin to ascribe a certain conscious operation to the objects of their reverence, especially to the fetiches in the forms of beasts or men. In this way the fetich becomes an idol, and F. an idolatry. The lowest form of such idolatry is where the savage does not hesitate to throw away, to chastise, or even to destroy his fetich, if it does not appear to gratify his desires. The reverence for sacred woods, mountains, streams, etc., which formed part of the religion of the old Greeks, Celts, and Germans, is not F. proper, but rather belongs to the worship of nature.

FE'TID LIMESTONE, a variety of limestone which gives out on being violently rubbed or struck with a hammer, a smell like that of sulphureted hydrogen gas. It has a dark color, produced very probably from the perishable portions of the animals whose hard skeletons compose the rock. This animal matter may perhaps also be the cause of the disagreeable smell. Stinkstone or swinestone has been likewise employed as characteristic names for this limestone.

FÉTIS, FRANÇOIS JOSEPH, 1784–1871. He was the son of an organist, and played the organ in his native town (Mons, Belgium), when only 10 years of age. He received his musical education from the leading teachers at Paris, and then traveled in Germany and Italy, studying the works of the great masters. In 1806, he returned to Paris, married a wealthy lady, and was enabled to devote his time to studying the history of music. In 1813, financial misfortunes compelled him to return to the practice of his profession, and he accepted the position of organist and instructor at Douai. In 1818, he became a professor in the conservatory of Paris, and published about this time his *Traité du Contrepoint et de la Fugue.* In 1827, he founded and edited the *Revue Musicale,* a journal devoted to musical criticism. The time that he could spare from professional duties was devoted to researches upon the theory of harmony, to the preparation of articles for a number of journals, and to the composition of operas and pieces of sacred music. In 1833, he was appointed chapel master and director of the royal conservatory of Brussels. In 1864, according to instructions left in the will of Meyerbeer, he became his musical executor, and superintended the production of the opera *L'Africaine.* The most successful of his own operas was *La Vielle,* which had a run of 100 nights. His principal works are: *Biographie Universelle des Musiciens et Bibliographie Générale de la Musique,* and his *Traite Complet de la Théorie et de la Pratique de l'Harmonie contenant la Doctrine de la Science et de l'Art.*

FETLOCK, or FETTERLOCK. English heraldic writers speak of a horse fetlock or fetterlock, and represent it thus. It seems to have been an instrument fixed on the leg of

a horse when put to pasture, for the purpose of preventing him from running off. In Scotch heraldry, a hoop is usually substituted for the chain, and the fetlock is represented as in the arms of Lokkert (Lockhart) of Barre, given by sir David Lindsay; Argent, on a bend sable three fetterlocks *or*. Some branches of this family carry a man's heart within the fetterlock, one of the heads of it having accompanied good sir James Douglas with king Robert the Bruce's heart to Jerusalem (Nisbet, i. p. 325).

FEUD (Angl -Sax. *fœght*) seems to be only another form of the word *fight*, and is allied to *foe*, and probably to *fiend*. It meant a war waged by one family or small tribe on another, to avenge the death or other injury of one of its members. In a certain state of society, this is a legitimate mode of obtaining redress. It prevailed extensively among the nations of Northern Europe; and it was only by gradual steps that the practice was first restricted and then abolished. The laws of Rudolf I. of Germany recognized the right of waging feuds. At last, partial associations were formed, the members of which bound themselves mutually to settle their differences by courts of arbitration and compensation, without going to war.

FEUDAL SYSTEM. By some, the word feu or feud, of which feudal is the adjective, is derived from the Lat. *fides*, faith, and *ead* or *odh*, or *od*, a Teutonic word signifying a property, or estate, in land; whilst by others, with perhaps greater probability, the first syllable also is maintained to be Teutonic, equivalent to *vieh*, cattle, ultimately from the same root with the Latin *pecus*, which, in the form of pecunia, came to signify property, and its representative, money—because, as Varro remarks, property amongst pastoral nations consisted of cattle (Varr., *De Lingua Latina*, 5, 19, s. 95, ed. Müll). A feudum, in this sense, would be a piece of land held for a *fee*, or pecuniary consideration, using pecuniary in the wide sense which its etymology suggests. Be this as it may, the feudal system, as a developed institution, belonged neither to the Teutonic nor to the Romanic nations, in their original and unmixed condition. We find it neither in the woods of Germany, nor in the Roman empire previous to the incursions of the Franks and Lombards. Neither the institutions described by Tacitus, nor those with which the Roman jurists have rendered us familiar, exhibit anything that is even analogous to it as a whole. But they each exhibit partial indications of some of the characteristics which most peculiarly distinguish it; and as it arose about the beginning of the 9th c., just when the fusion between the conquering barbarians and the subject populations of the Romanized provinces was everywhere taking place, it seems impossible to doubt that it was a result of the mutual influence of the two races. The subordination of class to class, and the intimate relations by which all the classes of the community were bound together, taken along with the independence and equality of the individual members of each class within itself, were amongst the most prominent features of the simple society of the Teutonic nations; and these correspond with wonderful accuracy to the relations of superior and vassal, beginning with the sovereign and descending to the smallest feudal proprietor, and also with the equality amongst *peers*, which existed within each of the feudal classes. On the other hand, the incomplete and fiduciary character of the proprietorship implied in a *feu*, as held in trust from a superior on the faith of services to be rendered, or dues to be paid, bore a very close analogy to the Roman emphyteusis (from which indeed the word feu has often been derived), and to the *dominium utile* as opposed to the *dominium directum*. See DOMINIUM and EMPHYTEUSIS.

The nature of this very important social institution, by which the life of every European people of any importance was governed from the beginning of the 9th till the close of the 13th c., and by which many of the forms of our modern life are still affected, will probably be more clearly understood if we commence our description of it from below, by exhibiting the position of the simple land-holder, than by adopting the monarch in whom it culminated, and from whom, in a technical sense, it was supposed to flow (see ALLODIAL), as our point of departure. The latter course has been more strictly adhered to by English writers, from the circumstance that, subsequent to the conquest, the whole territory of England was regarded as the property of the conqueror, and was by him divided amongst his barons, and by them amongst their dependents, an arrangement which was somewhat peculiar to England (see ALLODIAL), whereas the feudal system, in its essentials, was common to the whole of Europe. A feudal proprietor, then, or feudatory, was a person who held his lands from another, for his own life-time merely, in the earlier times, on condition of certain services which he was to perform to a superior or suzerain. Apart from the duties to which he was thus bound, he was not only a free man, but his position was that almost of an independent sovereign within his own small dominions. If his holding was at all an extensive one, he lived in a castle, which, notwithstanding the efforts of Charlemagne and his successors to prevent it, was generally fortified, not only for purposes of defense, but to enable him to pursue that life of rapine which in lawless times was not considered inconsistent with honesty or personal worth. For greater security, the castle was generally situated on a height, and under its walls there nestled a village, in which all the dependents of the proprietor, with the exception of his immediate family, and all those who lived by the cultivation of the soil, usually dwelt—isolated farm-houses and cottages being too much exposed to plunder to admit of their being scattered over the country then, as we see

them in England now. A portion of the inhabitants of each feudal domain were usually bound to the soil, and were thus subject to a species of slavery, the conditions of which varied according to the customs of different districts. These were spoken of as *adscripti* or *adscriptitii glebæ*, and were called *nativi*, or bond-men, and *villein-socmen*, as opposed to free soc-men on the one hand and serfs or *theowes* on the other, of whose position we shall speak below. (Stephen's *Com.* i. p. 188.) "He was," says sir Francis Palgrave, speaking of the ceorl, "a villain appurtenant; and, notwithstanding the language which was employed (to the effect, namely, that he could be bequeathed, bought, and sold). it must be understood that the gift, the bequest, or the sale, was in effect the disposition of the land and of the ceorl, and of the services which the ceorl performed for the land, a transaction widely differing from the transfer of a slave, whose person is the subject of the purchase." (*Rise and Progress of the English Commonwealth*, vol. i. p. 18.) The ceorl, moreover, could purchase his own freedom and that of his wife and offspring (*Ib.*). See VILLEIN. The rest were free tenants, farmers in the modern sense, though personal services to the proprietor probably in almost every case constituted a portion of the rent which was paid. Latterly, when the system of subinfeudation was introduced, many of his wealthier tenants came to stand to the baron, or lord of the domain, very much in the relation which we are about to describe as subsisting between him and his lord paramount. From being tenants-at-will, scarcely less subject to his authority and exposed to his caprices than the thralls, or villeins of the lowest class, they became vassals of their lord, and free citizens of what thus gradually developed itself into a feudal monarchy in miniature. The tenure by which this latter class held their lands was generally known in England as free socage (Stephen's *ut sup.* i. 205 *et seq.*). The castles by which the banks of the Rhine are studded along its whole course, from Bonn to Bingen, with their villages and parish churches, for the most part in the condition in which they were erected centuries ago, afford the most numerous and perfect examples of the arrangements of the feudal period which are perhaps anywhere to be met with. The possessors of these castles stood in a magisterial as well as a proprietary relation to their dependents. They exercised jurisdiction, extending even to the infliction of capital punishment, either in person or by means of officers whom they appointed for the purpose; and the castle was in general furnished with dungeons and other appliances for carrying their sentences into execution. Towards each other they stood in the relation of equals, or peers (Lat. *pares*); they were neighbors, simply, and friends or enemies as the case might be—too often the latter. But towards their immediate feudal superior, the count, marquis, duke, or whatever might be his title, to whom the government of the whole district belonged, they all stood in a relation which brought them in contact, and in some degree bound them to each other. Of him they held their lands on conditions somewhat similar to those on which they let them out to their own dependents. At first, as we have said, they were only tenants for life; but their rights in most countries very early assumed a hereditary character, the dominant proprietor's rights, on the death of a tenant, being confined to the exaction of certain dues from his son and successor, as a consideration for conferring on him, or rather for confirming to him, the feu which his father had held. Where the feu, fief or feoff, as it was sometimes called from the mode of admission—feoffment, or as it is said in Scotland, infeftment (q.v.)—descended to a female, the dominant proprietor was entitled to control her marriage, for the purpose of procuring himself a sufficient and trustworthy vassal; a privilege which, like all those of the lord, was latterly converted into a mere pecuniary claim. When the lord paramount, or suzerain, as he was called, held his court of justice, his vassal barons were the judges, being all on a footing of equality, or *pares curiæ*, as it was called. When he made war, either on his own account, or as furnishing a contingent to the army of the state, in such cases as in the national wars between France and England in the 12th and 13th centuries—which were the earliest instances of really national wars—his vassals were bound to attend him in person, and to furnish each the contribution of men, horses, arms, and other materials of war for which he was liable by the tenure on which he held his lands. In addition to these services, he was bound to watch and ward his castle, a duty which the minor barons almost invariably imposed on their vassals when the system of granting feus extended downwards to the class of persons who had formerly been mere tenants-at-will. Then there were certain dues which were almost always exigible from the vassal, such, e.g., as contributions towards providing a ransom for his lord when in captivity, for enabling him to celebrate the marriage of his eldest son with due pomp, or to provide a suitable dowry for his daughter. If these dues were not paid, the land reverted to the dominant proprietor, in relation to whom the vassal all along was a mere usufructuary. So far were the conditions of feudal holdings from being always the same, that no less than eighty different tenures have been enumerated; the onerous character of which varied from what was merely nominal, e.g., the payment of a white rose or a pair of spurs, "if asked merely," up to what was a rent in some degree equivalent to the value of the land. For an account of the manner in which the feudal system affected the constitution of land rights and the conveyance of landed property, and still affects them, see CONVEYANCING.

Inferior to all the classes of society in feudal Europe of which we have hitherto spoken, there is reason to fear that there existed almost everywhere, in the earlier times,

a class of the positively unfree. The lot of those who were in absolute slavery excluded them from the influences of feudality as a legal and social institution—"they were not reckoned," says Palgrave, "amongst the people"—but their existence is by no means to be left out of account, in forming to ourselves a picture of European society in feudal times. Of the condition of this class, as forming the substratum of feudal society, we shall have a pretty accurate conception from the following passage, in which Lappenberg describes them in Anglo-Saxon times, if we bear in mind, on the one hand, that subsequently to the conquest their ranks were probably swelled by such of the Anglo-Saxon population as was in absolute poverty; and on the other, that their position, in all the countries of Europe, was gradually ameliorated by the influences of Christianity, the spirit if not the letter of which has everywhere proved hostile to slavery. "One class of the Anglo-Saxon population, at the period of the Norman conquest, consisted of the unfree or servile (*theowas, esnas*), whose number, as registered in domesday-book, was little above 25,000. Of these, the majority were in a state of slavery by birth, whose forefathers had been either Roman slaves, British prisoners of war, or other enemies. Others, denominated *wite-theowas*, or penal slaves, had been freemen, but reduced by the sentence of the law to the servile condition, on account of debt or delinquency. (Palgrave *ut sup.* i. 28.) The master had the right of selling the theow in the country, but not beyond the sea, even if he had perpetrated crime. In other respects, the condition of the servile seems to have differed little from that of the indigent free slaves who had a special wergild, half of which fell to the master and half to the kin." (Thorpe's Lappenberg, ii. p. 320. It is probable that the vast majority of the servile class in Anglo-Saxon, and even in Norman times, consisted of persons of Celtic blood. (Palgrave *ut sup.* p. 26.) In proof of this fact, Lappenberg remarks that their numbers diminish as we recede from the Welsh border and from Cornwall, the places in which the Celtic or original British population is known to have taken refuge.

The social elements which counteracted and mitigated the influences of feudality in mediæval life, were monarchy, the church, which vigorously promoted the emancipation of the unfree, and above all, the growing wealth, power, and importance of the commons. In order to free himself from the rude and insolent dictation of his great feudal vassals, the king, in almost every European state, courted the alliance of the town communties, who had remained more in the condition in which they had been left by the Romans than the inhabitants of the country, and who were consequently all along more or less opposed to the growth and influences of feudality. See MUNICIPIUM. By their aid, even before the formation of standing armies, something approaching to executive power was placed in the hands of the sovereign. He was thus enabled to appoint and enforce the decrees of independent judges of his own, who in the earlier times were generally churchmen, and thus greatly to circumscribe the power and influence of all classes of feudal proprietors over their dependents. Though the period of bloom of the F. S. was, as we have said, from the 9th to the 13th centuries, in most of the countries of Europe, it everywhere, in many of its features, long survived the latter period. Even considered as a social, and not merely as a legal institution, in which latter capacity it still exists, it was in many respects in vigor in Scotland down to the year 1747, when military tenures were abolished by statute, as dangerous to public tranquillity.

FEU DE JOIE, or "running fire," a discharge of musketry into the air, made in honor of a victory or other great occasion. It commences with the right-hand man of the line, who discharges his rifle, and is followed successively, at scarcely perceptible intervals, by the men on his left, until the extreme left of the line is reached. The effect much depends on the regularity with which the slight interval between the discharges is preserved.

FEUERBACH, LUDWIG ANDREAS, German philosopher, fourth son of the following, was b. at Anspach, 28th July, 1804. After studying theology for two years at Heidelberg under Paulus and Daub, in 1824 he was attracted to Berlin for the purpose of hearing Hegel, and, soon after he abandoned theology, with the view of devoting himself entirely to philosophy. In 1828, he became *privatdocent* in the university of Erlangen, but in a few years quitted the academical chair, and gave up his whole time to literary labor. In a small anonymous work (*Gedanken über Tod und Unsterblichkeit*, Nürnberg, 1830), which attracted little attention when it appeared, he indicated that he had already gone beyond the stand-point of his master Hegel, by combating the doctrine of immortality. During the next few years, he published three works on portions of the history of philosophy, treating severally of the period between Bacon and Spinoza, of Liebnitz and of Pierre Bayle. But these historical works only paved the way to a critical investigation into the nature of religion and its relation to philosophy, the results of which have been given to the world in several works well known to speculative theologians. The most celebrated of these is his work on the Nature of Christianity (*Das Wesen des Christenthums*, Leip. 1841; 2 Aufl. 1843), which has been translated into English. Starting from the Hegelian doctrine, that the absolute comes to consciousness only in humanity, F. denies to it any existence beyond the human consciousness, maintaining it to be merely the projection by man of his own ideal into the objective world, on which he feels his dependence. All authority above man, and consequently all moral obligation, is therefore consist-

ently regarded as a delusion proceeding from man himself, and the highest good is explained as that which is on the whole most pleasurable. Yet even this highest good is further explained as consisting in resemblance to that ideal humanity which man creates for himself, and worships as God. A kind of ideal theism is therefore retained by F.; but when his doctrines were adopted by the mass of German communists, they degenerated, perhaps logically, into an actual atheism, which ignored any moral or social law imposed on the individual from any other source than himself.—The works of F. have been collected, with additions and corrections to bring them into accordance with his later views (*F.'s Sämmtliche Werke*, 10 Bde., Leip. 1846-66). He died 13th Sept., 1872. See Karl Grün's *Ludwig F.* (1874), and Beyer's *Leben und Geist F.'s* (1873).

FEUERBACH, PAUL JOHANN ANSELM, RITTER VON, one of the most distinguished criminal jurists of Germany, was b. at Jena, 14th Nov., 1775. Brought up at Frankfort-on-the-Main, where his father was an advocate, and educated in the gymnasium there, he went in 1792 to Jena, where he cultivated his mind by the study of philosophy, and then devoted himself to positive law. In 1798, he appeared as criminal jurist in a work *On the Crime of High Treason*, and in the following year he began to deliver lectures in the university of Jena. In his lectures and published writings, he introduced into criminal jurisprudence a new method of treatment, which was systematized in his compendium of German penal law (*Lehrbuch des Gemeinen, in Deutschland geltenden peinlichen Privatrechts*, Giessen, 1801; 14 Aufl. von Mittermaier, 1874). This celebrated work placed F. at the head of a new school of jurists, who maintain that the decision of the judge in every case ought to be determined solely by an express deliverance of the penal law, never by his own discretion, and who on that account obtained the name of rigorists. In 1801, F. was appointed ordinary professor in Jena, but in 1802 accepted a call to Kiel. In 1804, he was removed to the university of Landshut; but next year, having received a commission to prepare a penal code for Bavaria, he was transferred to Munich as privy referendary for the ministerial, judicial, and police departments; and in 1808 was appointed privy-councilor. The new penal code which he planned for Bavaria (*Strafgesetzbuch für das Königreich Baiern*, München, 1813), received, after a few modifications, the royal approval, and was taken as a basis in the emendation of the criminal law of several other countries. During this period also, he published his Remarkable Cases in Criminal Law (*Merkwürdige Criminalrechtsfälle*, 2 Bde., Giessen, 1808–11), which first led the way to a deeper psychological treatment of such cases. In 1812, he published a work on trial by jury, to which a second volume, on the judicial procedure of France, was added in 1825, as the result of a visit to Paris in 1821. In 1817, he became second president of the court of appeal in Bamberg, and afterwards first president of the court of appeal at Anspach for the Rezat district. In 1832, he published a work on the unfortunate Kaspar Hauser, whose mysterious fate had strongly attracted his interest. He had just edited a collection of his miscellaneous writings, when he died at Frankfort-on the Main, 25th May, 1833. An interesting life of F. has been written by his son, Ludwig (*Leben und Wirken Anselm von Feuerbachs*, 2 Bde., Leip. 1852). F. left, besides three daughters, five sons, who have all distinguished themselves in German literature.

FEU AND FEU-DUTY. A feu may be described, in familiar language, as a right to the use and enjoyment of lands, houses, or other heritable subjects, in perpetuity, in consideration of an annual payment in grain or money, called *feu-duty*, and certain other contingent burdens called casualities of superiority (see CASUALITY). Though a feu was frequently used to express any kind of tenure by which the relation of superior and vassal was constituted, in its narrower meaning, which we have here indicated, and which is that in which it is now almost exclusively used, it was opposed, on the one hand, to those tenures in which the return consisted of military or other personal service (ward and the like), and, on the other, to those in which the return was illusory (blanch), the only object of which was to preserve the relation of superior and vassal. A feu, in short, was a perpetual lease—a feu-farm, as it was often called—by which the tenant became bound to pay a substantial consideration, and his rights under which he might forfeit, as the penalty of non-payment. In the present day, the disposal of land in feu is practically a sale for a stipulated annual payment, equivalent to chief rent. It is in this light, accordingly, that feus are generally regarded in Scotland; and though feus resemble English freeholds in substance, their forms agree mostly with copyhold tenure. See Paterson's *Compendium of English and Scotch Law*. The system of feuing property for building purposes seems to have several advantages over that of the long building-leases common in England. From its perpetual character, it gives to the person actually in possession a feeling of greater interest in the property, and usually leads him to erect more enduring structures than he probably would do under a lease. For as time runs on, the feu often increases in value, while the reverse must always be the case with leasehold property. Neither does it in any degree interfere with the letting of property on lease or otherwise. Almost all the houses in Edinburgh and the other towns in Scotland which are let, either on leases or from year to year, are held by those who are spoken of as their proprietors not in absolute property, but as feus. Modern feu-duties are in general paid in money. When the stipulation is for a duty in grain, the quantity is valued by fiar prices for the year (see FIARS), and paid in money accordingly. The deed transferring the land in feu from the superior to the vassal is called a feu-charter

—a clumsily conceived and expensive document, which requires renewal in the case of heirs to vassals, or of parties to whom the vassal sells his right; and this repetition of the transaction, designated as "entering with the superior," forms the heavy drawback on the acquisition of land in feu, no matter how small in amount. Usually, the feu-charter reserves to the superior all minerals in the ground, and stipulates that the vassal shall build his house either in a particular style or of a certain value. By the Scottish stat. 1597 c. 246, it is declared that all vassals by feu-farm failing to pay their feu-duty for two years together, shall lose their right, in the same manner as if an irritant clause had been specially engrossed in their charter. But as the superior must obtain a decree declaring the loss of the vassal's right, before the forfeiture can take effect, if the feu is worth keeping, the duties, as a matter of course, will be paid. In the very rare case of the property having fallen off in value to the extent of rendering the feu a positive burden, it is possible that the irritancy may be voluntarily incurred. For the most part, land proprietors near towns and manufacturing villages are anxious to add to their annual rental by feuing grounds for building purposes. The rate of feu is very various, from as low as £8 to as high as £500 per acre per annum; a common rate is from £20 to £30 per acre. Whatever be the amount, it is payable by the feuar—not the tenant to whom the feuar may have let the property. When a building consists of several floors forming distinct dwellings, the feu-duty is allocated in certain proportions among the respective proprietors; the feuar to whom the lower floor belongs usually paying most. In properties of this kind, each is responsible only for his own share. Occasionally, feu-duties are offered for sale; and as a safe investment, bring from 25 to 30 years' purchase. In such cases, the vassal has an opportunity of extinguishing his feudal tenure, and becoming the superior. There are also instances of vassals sub-feuing. It is customary in feuing building lands for the superior to make the roads and drains. Relieved of this obligation, and getting possession of a site on a mere prospective annual payment of perhaps only a few shillings, the feuar has an undoubted advantage; looking, however, to the cumbersomeness and cost of the feu-charters, and the liability of successors to pay fines at entry, the system is entangled, troublesome, and expensive; and, at least as far as forms are concerned, is allowed to stand in need of reform.

FEUILLANS, CONGREGATION OF, a reform of the Cistercian order, remarkable as forming part of the great religious movement in the Roman Catholic church during the 16th c., contemporary with and probably stimulated by the progress of the reformation. The author of this reform was Jean de la Barriere, abbot of the Cistercian monastery of Feuillans, who, painfully struck by the relaxation of its discipline, laid down for himself a new and much more austere course of life, in which he soon found many imitators and associates among the brethren of his order. The rule thus reformed was, after considerable opposition from the advocates of the old rule, approved, with certain modifications, by pope Sixtus V.; the reformed congregation, however, being still left subject to the authority of the abbot of Citeaux; and a convent was founded for them by Henry III. in the Rue St. Honoré, Paris. The subjection to the abbot of Citeaux was removed by Clement VIII. in 1595; and Urban VII., in 1630, separated the congregation into two branches, one for France, and the other for Italy, each under a distinct general. The rules of both these branches were subsequently modified about the middle of the same century.

The celebrated revolutionary club of the Feuillants took its name from this order, the convent of which, in the rue St. Honoré, was the place of meeting for the members of the club. It was founded in 1790 by Lafayette, Sièyes, La Rochefoucauld, and others holding moderate opinions. The club was at first called the "Company of 1789," and was intended to support the constitution against the ultra party. It reckoned among its members individuals of all classes, who took the constitution of England as their model. This opposition served, however, only to accelerate the revolutionary movement. On the 27th Jan., 1791, on count Clermont Tonnerre being elected president of the club, a popular insurrection broke out against it; and, on the 28th Mar., the assembly in the cloister was forcibly dispersed by a raging mob.

FEUIL'LEA, a genus of plants of the natural order *cucurbitaceæ*, named in honor of Louis Feuillée, a French botanist and traveler in Chili. The species are generally half-shrubby climbers, natives of the warm parts of America. The seeds, at least of some of them, as *F. cordifolia* and *F. trilobata*, contain a great quantity of a bitter fixed oil, which is obtained by expression, and is used for lamps. It has also a high reputation in the West Indies and Brazil as a cure for serpent bites, and an antidote to some kinds of vegetable poisons.

FEUILLET, OCTAVE, b. 1812; a French novelist and dramatist; was educated in the college of Louis-le-Grand, of Paris. His early writings were published under the name of "Désiré Hazard," *Le Grand Vieillard*, written in 1844, conjointly with Paul Bocage and Albert Aubert, being the first. Feuillet afterwards became a constant contributor to newspapers and reviews, besides writing many comedies, dramas, and farces, which achieved popularity. He was elected to the French academy in 1862, and in the following year was made an officer of the legion of honor. Afterwards he was appointed librarian of the imperial residences, which position he held until the revolution of Sept., 1870. His most noteworthy dramatic productions are: *La Nuit Terrible; Le Bourgeois de Rome;*

La Crise; Le Pour et la Contre; Péril en la Demeure; La Fée; Le Village; Dalila; Le Roman d'un Jeune Homme Pauvre; La Tentation; La Rédemption; Montjoye; La Belle au Bois Dormant; Le Cas de Conscience; Julie; La Clé d'Or, a comic opera; and *L'Acrobate*. Among his novels are *Polichinelle*; *Onesta; Rédemption; Bellah; Le Cheveu Blanc; La Petite Comtesse; Le Roman d'un Jeune Homme Pauvre*, which has been translated into many languages; *Histoire de Sibylle; Monsieur de Camors*, a story remarkable for invention and vigor; *Julia de Trécœur; Un Marriage dans la Monde;* and *Le Journal d'un Femme*. He is also the author, jointly with Paul Bocage, of a number of other dramas, and has published several poems.

FEUILLETON (Fr.), literally a small leaf, signifies that portion of a political newspaper set apart for intelligence of a non-political character, for criticisms on art, literature, etc., and usually separated from the main sheet by a line. The F. is an invention of the *Journal des Débats*, which, since the year 1800, has held an important place in the sphere of literary criticism. By degrees, the belles-lettres element began to pervade it; and the result was a species of light journalistic literature, in which Jules Janin became the acknowledged king. In the years immediately preceding the revolution, Feb., 1848, entire romances were spun out in the feuilleton. The *Constitutionnel*, in particular, made large pecuniary profits by the social romances of Eugene Sue, which it published in this manner. The French system has been imitated in England and Germany, though with less success than in France.

FÉVAL, Paul Henri Corentin, b. 1817; a French writer of fiction, bred to the law, which he soon abandoned for authorship. His novels are numerous, and a number of them have appeared in English, among them *The Loves of Paris; The Duke's Motto; The Woman of Mystery; Thrice Dead*, etc. In 1876, he became a Roman Catholic, and wrote in defense of the Jesuits.

FEVE'DA, an island of British Columbia, is situated in the gulf of Georgia, between Vancouver island and the continent. It is in lat. 49° 41′ n., and long. 124° w., measuring 32 m. in length by 2 in average breadth. It possesses a snug little harbor, which appears to be all the more valuable on account of the superior quality of the fuel which abounds on the spot. Its formation is understood to be wholly of limestone.

FEVER (Lat. *fĕbris*, from *ferveō*, I grow warm, or perhaps from *februō*, I cleanse), a form of disease characterized principally by increase of the temperature of the body, which, however, requires to be estimated according to the state of the internal parts, rather than the external; the surface of the body, and particularly of the extremities, being not unfrequently cold rather than warm. Having regard to the heat of the surface only, F. has commonly been considered as passing through three distinct stages, more or less marked: 1, the cold or shivering stage; 2, the hot stage; 3, the sweating stage. This description is perfectly correct in most cases, but it requires to be qualified by the remark, that even in the cold stage of fevers, it is now well ascertained that the blood and the internal organs have an elevated temperature, as estimated by the thermometer introduced into the cavities of the body. In the cold stage of F., accordingly, and even in the most violent ague, when the teeth are chattering with cold, and the whole surface is pale and clammy, the state of the system is well expressed by the aphorism of Virchow (the most ingenious and comprehensive of the modern exponents of the pathology of F.), to the effect that "the outer parts freeze while the inner burn." Increased heat of the body, therefore, is the most essential, perhaps the only essential phenomenon of fever. The other symptoms are loss of appetite, thirst, restlessness, and vague general uneasiness, often headache, and diffused pains in the back and limbs; a frequent pulse, which is sometimes also full and hard; a furred tongue, often with red margin; a flushed face and suffused eyes; vitiated secretions, and general derangement of the functions, with great debility of the voluntary movements of the limbs. The disease often commences with a shivering, or rigor, as it is technically called; this leads through the cold stage to the hot, which usually follows pretty rapidly, and is attended by all the febrile phenomena in their highest degree; the skin being often very pungently warm to the hand, dry, and harsh; by and by, the pores appear to open, moisture begins to bedew the surface, and the pungent heat disappears: the disease is then about to pass into its third or sweating stage, which ushers in the convalescence. For the special symptoms of particular fevers, see Typhus and Typhoid Fevers, Small-pox, Scarlet Fever, Measles, Ague, Intermittent and Remittent Fever, Yellow Fever.

Besides being thus the leading fact in a number of specific diseases, F. is also associated with many other forms of disease as a secondary or subordinate phenomenon, connected with an inflammation or other distinctly local disease. Thus, in pneumonia (q.v.) or enteritis (q.v.), F. is as much a part of the symptoms as pain or any other; and even in some chronic or long-standing diseases, as in consumption (q.v.), a slow and consuming type of F. (see Hectic Fever) is found to be very generally present. Indeed, there is no condition which rules so large a part of the physician's duty, whether in the way of distinguishing diseases or of curing them, as this constitutional state. F. is also very generally prevalent after surgical operations and injuries, of which it constitutes one of the leading dangers; and in midwifery practice, it is well known as constituting a large part of the risks of the puerperal state, whether in the slighter form commonly

called *a weed*, or in the more dreaded and fatal, often epidemic, form of puerperal fever (q.v.)

The family of fevers is thus separated pretty naturally into two large groups, in one of which the F. is the greatly predominating fact, and determines the specific character of the disease: the local disease (if present) being quite subordinate, and usually secondary in point of time; the other, where the opposite order prevails, and the F. is obviously secondary. Hence the distinction embodied in medical language between *idiopathic* (i.e., self-originating, spontaneous), and *symptomatic* or secondary fevers. Fevers are also distinguished, with reference to their mode of diffusion, as epidemic (q.v.) and endemic (q.v.); or with reference to their supposed cause, as contagious, infectious, malarious, pneumonic, rheumatic, etc.; or with reference to their incidental symptoms and their peculiarities of course and termination (the presumed *specific* phenomena attracting, of course, particular attention), as eruptive (see EXANTHEMATA) or non-eruptive, bilious, gastric, enteric, mucous, putrid, malignant, typhoid, etc.

Among these distinctions, based upon the course of the F., one demands particular notice, as involving an important law of febrile diseases generally, and of a large class of fevers of warm climates in particular. Periodic increase and diminution, or paroxysms of longer or shorter duration, with intervals of more or less perfect relief from all the symptoms, are characteristic of most diseases of this kind, but especially of those arising from *malaria*, i.e., emanations from the soil, educed under the influence of solar heat. The duration of the paroxysms and of the intervals, the complete *intermission*, or more partial *remission*, of symptoms, become in such cases the characteristic facts that mark the *type*, as it is called, of the F., which is accordingly distinguished as intermittent, remittent, or continued; and, according to the length of the periods, Tertian, Quartan, Quotidian, etc. (q.v.).

The true pathology, or ultimate essence of the febrile state, is still a subject open to question; but it is in accordance with modern physiology to regard F. as connected with some complex derangement of the functions on which the animal heat is known to depend—viz., the nutrition of the textures, or the vital changes constantly in operation between the blood, on the one hand, and the ultimate atoms of solid texture, on the other. Recent observations have shown that, in the paroxysm of ague, the waste of the nitrogenous tissues is in excess; and further, the curious result appears to be arrived at, that for almost every grain of excretion representing this excess of waste in a given time, there is a proportional increase of the temperature of the blood, according to accurate thermometric observations. If such observations are corroborated and extended, it will probably appear that the cause of F. is to be found in an increased destructive decomposition of the atoms of texture through the oxygen absorbed at the lungs and circulated with the blood; perhaps under the influence of a derangement of nervous system; which has been shown by experiment to have a very marked control over the generation of animal heat.

The treatment of F. will be considered under the separate forms already referred to.

FEVER BUSH, a shrub common in the northern states, remarkable for graceful form and beautiful leaves; the *benzoin odoriferum* of Nees. It is from 4 to 10 ft. high, and grows best in moist and shady places. A decoction of the twigs is used as stimulant in fevers, and to cure the itching which follows vegetable poisoning. The berries have occasionally been used as a substitute for allspice, and sometimes the shrub is called spice bush.

FE'VERFEW (*pyrethrum parthenium* or *matricaria parthenium*), a perennial plant, found in waste places and near hedges in Britain and many parts of Europe. It is botanically allied to chamomile (q.v.), and still more nearly to wild chamomile (*matricaria chamomilla*), and much resembles these plants in its properties, but differs in appearance, the segments of its leaves being flat and comparatively broad, and its flowers smaller. Its habit of growth is erect, its stem much branched, and about 1 to 2 ft. high. It has a strong, somewhat aromatic smell. It was once a popular remedy in ague, and from time immemorial has been used as an emmenagogue. It is employed in infusion, and is stimulant and tonic. A double variety is not uncommon in gardens.—Of the same genus with F. is the MAYWEED (*P. inodorum* or *M. inodora*), with leaves more resembling those of chamomile, but almost scentless, and large flowers, with white ray and yellow disk, very common in cornfields and waste places in Britain and throughout Europe.

FE'VERWORT (*triosteum perforliatum*), a perennial plant of the natural order *Caprifoliaceæ*, having an erect, round, hairy, fistular stem, from 1 to 4 ft. high, opposite ovato-lanceolate entire leaves, axillary whorls of flowers, with tubular 5-lobed corolla, and leathery 3-seeded berries. It is a native of North America, where its dried and roasted berries have been occasionally used as a substitute for coffee; but it is chiefly valued for its medicinal properties, its root acting as an emetic and mild cathartic. It is sometimes called *Tinkar's root*, from Dr. Tinkar, who first brought it into notice.

FEW, WILLIAM, 1748–1828; lived in North Carolina, Georgia, and New York. He was a member of the convention to frame the constitution for Georgia; a member of the state assembly, and of the council. He was a col. in the revolution, surveyor-gen., judge of a county court, and delegate to the continental congress. He assisted in

framing the federal constitution, and in urging its adoption by his state. Subsequently, he was a member of the two constitutional (state) conventions, and United States senator.

FEZ (Ar. *Fas*), the chief and most northerly province of the empire of Morocco, occupies the country between the Atlas mountains and the Mediterranean. Its population is estimated at about 3,200,000, consisting of Berbers, Moors, Arabs, negroes, Jews, and a few Europeans. The province is divided into 15 districts.—FEZ, the capital of the province, in lat. 34° 6′ n., and long. about 5° 0′ w., was founded by Muley Edris II., in the year 808 A.D., and was reckoned during the middle ages—when it was the capital of the kingdom of Marocco—one of the most magnificent and largest cities in the Mohammedan world. It is said to have contained about 90,000 dwelling-houses and about 700 mosques, and was celebrated for its splendid public buildings, schools, and scientific institutions. On the removal of the court to Morocco, about the middle of the 16th c., F. gradually fell into decay. It is still, however, a place of considerable importance. The situation of F. is singular; it lies in a valley, formed by surrounding hills into a sort of funnel, the higher parts of which are covered with trees, orange-groves, and orchards. It is divided into Old and New F. by one of the upper branches of the Sebu, and has a population variously estimated at from 100,000 to nearly 150,000 souls. There are 100 mosques, of which the most important is that built by the sultan Muley Edris, which contains his monument, and is an inviolable refuge for criminals, however guilty. On account of its numerous mosques and relics, it is regarded as the holy city of the western Arabs. It has seven well-attended schools. The old palace of the sultan is large, but is now falling into decay. In other respects, the external aspect of F., with its numerous baths, caravanseras (of which there are about 200), and bazaars, resembles that of Mohammedan towns in general; the multitude of hotels and shops alone imparting to it a peculiar and more European character. A considerable trade is still carried on, by means of caravans, with the adjoining countries on the s. and e., extending as far as Timbuctoo. F. carries on manufactures of woolens, sashes, silk-stuffs, girdles, slippers, fine carpets, etc. Its artisans are also skillful workers in gold and jewelry.

FEZZÂN (more correctly, FESSÂN), an extensive oasis in the n. of Africa, in 24° to 31° n. lat., and 12° to 18° e. long. It lies s. of the regency of Tripoli, and has a population variously estimated at from 75,000 to 150,000 souls. The n. is for the most part hills, but the hills are composed of perfectly bare, black quartz sandstone, with no rivers or brooks among them, and the s. is mainly a level waste of dry sand. Not more than a tenth of the soil is cultivable. In the neighborhood of the villages, which are situated mainly in the wadies, wheat, barley, etc., are cultivated. Camels and horses are reared in considerable numbers. Lions, leopards, hyenas, jackals, wild-cats, porcupines, vultures, ostriches, buzzards, etc., are found in abundance. The inhabitants are a mixed race, of a brown color, in many respects resembling the negroes, but are generally well formed. The original inhabitants belonged to the *Berber* family, but since the invasion of the country by the Arabs in the 15th c., the traces of this native north African element have gradually become very faint. The language spoken is a corrupt mixture of Berber and Arabic. The people are far behind in civilization, and occupy themselves with gardening and the manufacture of the most indispensable necessaries of life. Considerable trade is carried on by means of caravans between the interior of Africa and the coast. F. is the Phazania of the ancients, against which the Romans, under Cornelius Balbus, undertook a campaign about 20 B.C. During the classic period, as well as in the middle ages, it was governed by its own princes, who were at first independent, but afterwards became tributary to the pashas of Tripoli. In the year 1842, F. was conquered by the Turks, and is now attached to the government of Tripoli. Murzuk, the capital of F., is a well-built town, with broad streets and a population of 3,000. Merchandise valued more than £21,000 annually changes hands here, and of that amount the slave-trade forms seven eighths. Murzuk is now the great starting-point from the n. for the interior of negroland. Compare Barth's *Travels in Central Africa* (Lond. 1857), and also the descriptions given of Fezzân by Denham, Clapperton, Oudney, Richardson, Dr. Vogel, etc.

FIACRE, SAINT, an anchorite said to have been a son of Eugenius IV., king of Scotland. He lived in the 7th c., and voluntarily renounced the world, going to France to counsel with St. Faro, bishop of Meaux. The bishop gave him a residence in the forest of Breuil, in Brie, where he built a cell and gave asylum to such strangers as fell in his way. After his death, about 670 A.D., his shrine had the reputation of working miracles, and pilgrimages to it began. These pilgrimages created such a demand for conveyances as to give the name of the saint to a hackney-coach, which in France is called a *fiacre*. St. Fiacre is the patron saint of gardeners.

FIAR. See FEE AND LIFE-RENT.

FIARS (a word said by Jamieson to be of Gothic origin, and to exist in the same form in Icelandic). The *fiars* prices in Scotland are the prices of the different kinds of grain of the growth of each county for the preceding crop, as fixed by the sentence of the sheriff, proceeding on the report of a jury summoned for the purpose, before whom

the evidence of farmers and corn-dealers is produced. The values thus officially ascertained serve as a rule for ascertaining the prices of grain in all contracts where they are not fixed by the parties; and in many sales it is agreed to accept the rates fixed by the fiars. Ministers' stipends, in so far as they consist of grain and crown dues, are also paid by the F. prices of the county for each year. With a view to the latter, F., in former times, were struck in the exchequer. An error in striking the F. will not afford a ground of suspension.

The form of procedure in "striking the fiars," as it is called, is regulated by act of sederunt, 21st Dec., 1723, renewed 29th Feb., 1728. The time fixed by this act for summoning the jury is between the 4th and 20th of Feb., and the verdict must be returned before 1st Mar., old style; which is generally considered too early, as before that time not much grain of the previous crop has been brought into the market. Mr. Barclay, sheriff-substitute of Perthshire, in his Digest, gives the following account of this difficult and delicate process as practiced in his county: "In Perthshire, the fiars court is held on the last Friday of Feb., or the first Friday of Mar. The jury consists of eight heritors, a few farmers, and some neutral parties, especially one or two able to check the calculations. An experienced accountant is sworn, and acts as such, but is not on the jury, and is paid a fee from the county rates. The list of the jury is shifted every alternate year, thereby giving sufficient release from duty, and yet securing persons skilled in the practice. Some years ago, it was arranged to take no juror who either paid or received rents according to the fiars; but this greatly limited the choice, and was complained of, and abandoned. All considerable dealers in Perthshire victual, whether resident in Perthshire or elsewhere, are uniformly summoned, and, in addition, every person whose name is given in by whatever person interested." As grain is commonly sold according to weight, one shilling being generally allowed on wheat for every additional pound-weight on every bushel; on an application by the farmers, it was agreed to determine the classification by taking a certain weight as the point of division. The The first thing which the jury do is consequently to determine the point of weight. The witnesses are then sworn to the schedules, which they receive after harvest, and in which they insert every separate quantity of grain sold, with the dates and prices divided into first and second classes, according as the judgment of each witness dictates, and the weight of each parcel. The results of the separate schedules are inserted by the accountant into a general schedule, which is summed up by the accountant, such members of the jury as are capable assisting him. The result constitutes the F. prices for the year. The same mode is not adopted in England; but weekly averages of *all* grain sold at public markets are ascertained and published in the *Gazette*, and this is without respect to the produce of particular counties. 9 Geo. IV. c. 60; 5 and 6 Vict. c. 14; 9 and 10 Vict. c. 22. See *Historical Account of the Striking of the Fiars in Scotland*, by George Paterson, esq., advocate, 1852.

FIAS'CO, a term borrowed from the Italian theater, and now naturalized in France and Germany, besides being occasionally used by English writers. It signifies a failure to please on the part of an actor or singer, and is thus the opposite of *furore*, although why the word, which simply means a bottle, should come to be thus applied, is more than anybody knows. In Italy, it is not uncommon to hear an audience cry out, "*Olà, olà, fiasco,*" even when the singer has only made a single false note.

FI'AT, in English law, a short order or warrant of some judge for making out or allowing certain processes.

FIBER. See MUSQUASH.

FI'BER (Lat. *fibra*), a term of very common use as applied to objects of a stringy or thread-like character, whether of the animal, vegetable, or mineral kingdom. Minerals are often described as of a fibrous structure or appearance, in which there is, however, no possibility of detaching the apparent fibers from the general mass, or in which they are inflexible and brittle if detached: but a more perfect example of mineral F. is found in *amianthus*, a variety of asbestus (q.v.). For the scientific use of F. with regard to the animal kingdom, we refer to the article MUSCLE; for its scientific use with regard to the vegetable kingdom, to VEGETABLE TISSUE and to WOOD and WOODY FIBER. In its more popular, but perfectly accurate use, it includes the hair or wool of quadrupeds, the silken threads of the cocoons of silk-worms and other insects, the fibers of the leaves and of the inner bark of plants, and the elongated cells or hairs connected with the seeds of plants, the ordinary materials of cordage and of textile fabrics.

Of mineral substances, amianthus alone has been used for textile fabrics, and that only to a very limited extent. Animal and vegetable fibers have, from the earliest ages, supplied man with cordage and with cloth. How the invention took place, can only be matter of conjecture.

The animal fibers used for textile purposes are chiefly of the two classes already mentioned—(1) the wool or hair of quadrupeds, and (2) the silk of the cocoons of insects. To these may be added (3) the byssus (q.v.) of mollusks, but this class contains only the byssus of the pinna (q.v.) of the Mediterranean, an article of ancient and high reputation, but more of curiosity than of use. The skins and intestines of animals, although sometimes twisted or plaited for various uses, can scarcely be reckoned among the

fibrous materials afforded by the animal kingdom. For information regarding the fibers obtained from the cocoons of insects, see SILK and SILKWORM. It is to the first class that the greater number of different kinds of animal F. used for textile purposes belong; and the wool of the sheep far exceeds all the rest in importance. See SHEEP and WOOL. But the wool or hair of other quadrupeds is also to some extent used, as of the goat (see GOAT and ANGORA), the alpaca (q.v.), the camel (q.v.), the bison (q.v.), the musk ox (q.v.), the yak (q.v.), and the chinchilla (q.v.); all of which, except the last—and it has but a doubtful claim to be mentioned—are, like the sheep, ruminants. The hair of comparatively few animals is sufficiently long for textile purposes, or can be procured in sufficient abundance to make it of economic importance. The warmth of clothing depends much on the fineness of the hair, and on other characters in which wool particularly excels.

The useful vegetable fibers are far more numerous and various than the animal. They are obtained from plants of natural orders very different from each other; none of them, however, belonging to the class of acrogenous or cryptogamous plants. They are obtained also from different parts of plants. Those which are derived from exogenous plants are either the fibers of the inner bark (or bast, q.v.), as flax, hemp, etc., or hairs of the fruit, as cotton. The useful fibers of endogenous plants sometimes also belong to the fruit, as coir or cocoa-nut F., and the unimportant F. of cotton-grass. The spathe of some of the palms is sometimes also sufficiently fibrous and strong to be used for bags, etc., without separation of its fibers; the fibers of the interior of the stem of old cocoa-nut palms are sometimes used for coarse purposes; the fibrous character of the stems of the slender palms called rattans, of bulrushes, etc., fits them for wicker-work, for plaiting into chair-bottoms, and the like; the roots of the *agaves* (q.v.) yield fibers useful for various purposes; but generally, the more valuable fibers obtained from endogenous plants are those of their leaves, either of the leaf-stalks—as piassaba F. and gomuto or ejoo F., both produced by palms—or of the blade of the leaf, as pine-apple F., pita flax, New Zealand flax, bowstring hemp, etc. The fibers of the leaves of endogens being parallel to each other, are easily obtained of sufficient length for economical purposes; whilst the reticulated fibers of the leaves of exogens, even if long enough, which is comparatively seldom the case, cannot be separated for use. The *bast* fibers of exogens, however, are often of sufficient length, and easily separable. Their separation is generally accomplished by steeping in water, or by frequent bedewing with water, so as to cause a partial rotting of the other parts of the bast and of the bark which covers it. But the fibers of endogens being in general discolored and injured by this process to a much greater degree than those of exogens, mere mechanical means are usually preferred for their separation, such as beating, passing between rollers, and scraping. The fibers of many leaves are separated by scraping alone. The fibers of *fruits*, as cotton, exist in nature in a separate state, like the wool or hair of animals, and require merely to be collected and cleaned.

A complete enumeration of the kinds of vegetable F. applied to economical purposes would not be easy. Flax, hemp, and cotton have long had the pre-eminence. To these have recently been added New Zealand flax, jute, sunn or sunn hemp, coir, pita flax, abaca or Manilla hemp, bowstring hemp, China grass, piassaba, and many others. New kinds are continually being brought under notice, and to this industrial exhibitions and industrial museums have most beneficially contributed. New kinds, however, do not immediately command the attention they deserve. "If a new product is sent into the market," says Dr. Royle, "few of the regular customers will buy it, as they want that to which their machinery and manufactures are suited." But for the judgment and enterprise of Mr. Salt, it might have been long ere alpaca wool had obtained its present place among the materials of our manufactures; and there is much reason to think that many vegetable fibers, now little regarded, may yet in like manner be exalted to importance.

For the use of vegetable fibers in the manufacture of paper, see PAPER.

FIBROUS PLANTS. Without attempting a complete enumeration of plants which yield fibers employed for economical purposes, we give the following as a list which may be useful. Many of the subjects will be found treated in separate articles, or more fully noticed under the natural orders. The most important are indicated by capitals.

I. EXOGENOUS PLANTS.

1. *Fibers of the Fruit.*

Nat. ord. *Malvaceæ.* COTTON, produced by species of *Gossypium.*

——— *Sterculiaceæ.* Silk-cotton, or vegetable silk, the produce of *Bombax villosum*, etc.

——— *Asclepiadaceæ.* The silk-like down of the seeds of Virginian silk (*Asclepias Syriaca*).

2. *Fibers of the Inner Bark or Bast.*

——— *Malvaceæ.* Decanee hemp (*Hibiscus cannabinus*).—Other species of *Hibiscus*, *Althæa cannabina*, *Sida abutilon*, etc.

——— *Sterculiaceæ.* A number of species of different genera; some of them cultivated to a small extent.

Nat. ord. *Tiliaceæ*. JUTE (*Corchorus olitorius, C. capsularis*, etc.).—The bast of some trees of this family, as the linden or lime (*Tilia Europæa*, etc.), is used for mats, ropes, etc. See BAST.
——— *Linaceæ*. FLAX, the produce of *Linum usitatissimum*.
——— *Leguminosæ*.—SUNN, Jubbulpore hemp, etc., the produce of species of *Crotalaria*.
Spanish broom (*Spartium junceum*).
Bokhara clover (*Melilotus arborea*).
Dhunchee (*Sesbania aculeata*).
Species of *Cytisus* (as common broom), butea, *Parkinsonia, Bauhinia*, etc.
——— *Asclepiadaceæ*. Jetee (*Marsdenia tenacissima*).
Yercum or mudar (species of *Calotropis*).
Virginian silk (*Asclepias Syriaca, A. debilis*).
Other species of several genera.
——— *Apocynaceæ*. Canadian hemp (*Apocynum cannabinum*).
——— *Urticeæ*. Common nettle (*Urtica dioica*) and other species of *Urtica*.
Species of *Bœhmeria*, one of them yielding CHINA GRASS fiber.
——— *Cannabinaceæ*. HEMP (*Cannabis sativa*).
Hop (*Humulus lupulus*).
——— *Moraceæ*. The bark of some species of fig.
——— *Coniferæ*. Inner bark and roots of some species of pine and fir.
——— Unknown. Buaze.

II. ENDOGENOUS PLANTS.

Nat. ord. *Liliaceæ*.
NEW ZEALAND FLAX, fiber of leaves of *Phormium tenax*.
Bowstring hemp, fiber of leaves of species of *Sanseviera*.
Fiber of leaves of species of *Aloë* and of *Yucca*.
——— *Amaryllideæ*. Pita flax, fiber of leaves of *Agave Americana*.
Fiber of leaves of species of fourcroya.
——— *Musaceæ*. Abaca or Manilla hemp, and plantain fiber, obtained from leaves of species of *Musa*.
——— *Bromeliaceæ*. Pine-apple fiber, curratow, etc., fibers of leaves of species of *Bromelia*, etc.
——— *Pandanaceæ*. Fibers of leaves of screw-pines.
——— *Palmaceæ*. COIR or cocoa-nut fiber, from husk of cocoa-nut. Fiber of cocoa-nut stem. Gomuto or ejoo fiber, from leaf stalks of gomuto palm (*Arenga saccharifera*).
Piassaba, from *Attalea funifera* and *Leopoldinia Piassaba* (the Chiquichiqui palm).
Other fibers from leaf-stalks, etc., of many palms.
——— *Cyperaceæ*. Fiber from leaves of *Eriophorum cannabinum* (see COTTON-GRASS). Mats, chair-bottoms, etc., made of different *Cyperaceæ*.
——— *Gramineæ* or grasses. Esparto (*Stipa tenacissima*).
Moonja (*Saccharum munja*).

FIBRINE is an organic compound, occurring both in animals and plants. In its chemical composition it closely resembles albumen and caseine, and it was until recently believed that these three substances possessed a common radical, to which the name *proteine* (from *proteno*, I am first) was given, the proteine being regarded as the primary basis of all the tissues of the body. Hence we frequently find F. described as one of the proteine bodies.

F. is mainly distinguished from the allied substances, albumen and caseine, by its separation in a solid state, in the form of extremely delicate filaments or lamellæ, from any fluid in which it is dissolved, very shortly after the abstraction of the latter from the organism.

Animal F., which is of the greatest physiological importance, occurs principally in the blood, the lymph, and the chyle. In order to obtain it in a state of purity, we beat or stir the blood with a bundle of twigs, to which the F. adheres in strings. The impure F. thus obtained is then rinsed with water, boiled with alcohol and ether—to remove fatty matters—and dried. In healthy venous blood, it scarcely ever amounts to 3 in 1000 parts, its average quantity being 2.3. Small, however, as its amount is, it varies more than any other constituent of the blood, and in acute inflammatory diseases sometimes exceeds its average by 5 or 6 times. Moreover, arterial blood contains more F. than venous blood. In the lymph and chyle, it occurs in considerably less quantity than in the blood. In inflammatory exudations, we find F. in the contents of the serous cavities—as, for example, of the pleura and peritoneum—and on the mucous membrane (as in croup); in these cases, it usually occurs in a state of spontaneous coagulation.

There are good physiological reasons for believing that F. is formed from albumen, and not directly from the food; and as F. contains a little more oxygen than albumen, it has been inferred that it is formed from the latter by a process of oxidation. As, however, more F. is found in the blood in pneumonia—when a considerable portion of

the lungs is rendered impervious to air—than in almost any other disease, we are inclined to adopt the opposite hypothesis, that the augmentation of the F. in inflammatory blood is caused by an insufficient supply of oxygen. When oxygen is abundantly introduced into the blood, the F. rapidly undergoes further transformation. on the other hand, when, in consequence of impeded respiration, the quantity of oxygen conveyed to the blood is not sufficient to effect the further normal oxidation or transformation of the F., we have an accumulation of that constituent in the circulating fluid.

It has, however, been a disputed question, whether F. is produced in the elaboration or in the disintegration of the tissues. For the discussion of this subject, and of the other points connected with F., we must refer to Lehmann's *Physiological Chemistry*, vol. i. pp. 361–364.

The substance forming the mass of flesh or muscular tissue was formerly regarded as identical with coagulated blood-fibrine. The two substances are, however, chemically distinct, and the muscle-fibrine will be described under its new chemical name, SYNTONINE (from *sunteinein*, to contract or render tense).

FIBROUS TISSUE. See TISSUES.

FICHTE, IMMANUEL HERMANN, son of Johann Gottlieb, and professor of philosophy in the university of Tübingen, was b. in 1797, and early devoted himself to philosophical studies, being attracted by the later views of his father, which he considers were essentially *theistic*. He also attended the lectures of Hegel, but felt averse to his pantheistic tendencies, and leaned more to Schleiermacher and Schelling. Occupied at first as a teacher, F. was appointed professor of philosophy in Bonn in 1836, and from 1842 to 1863 held a chair in the university of Tübingen. His chief works are *Beiträge zur Characteristik der neuern Philosophie* (1841); *Grundzüge zum Systeme der Philosophie* (1839–47); *System der Ethik* (1850); *Anthropologie* (1856); *Psychologie* (1864); *Vermischte Schriften* (1869); etc. He suggested meetings of philosophers similar to those held by physicists; and at the one held at Gotha, 1847, he delivered an address *On the Philosophy of the Future* (Stuttg. 1847). The great aim of his speculations has been to find a philosophic basis for the personality of God, and for his theory on this subject he has proposed the term *concrete theism*, to distinguish it alike from the abstract theism which makes God almost an unreality—a barren aggregate of lifeless attributes; and on the other hand, from the all-absorbing pantheism of Hegel, which swallows up the human and the divine in its own inapprehensible totality. Some time ago, F. published an important work, *Zur Seelenfrage, eine Philosophische Confession*, which has been translated into English by J. D. Morell, under the title of *Contributions to Mental Philosophy* (1860), for an account of which see art. CONSCIOUSNESS. During the movements of 1848, he issued several political tracts. The principle of F.'s politics is not unlike Dr. Arnold's maxim. He holds that there is only one kind of real conservatism, that of constant well-planned reform; and that all revolution consists either in attempts to precipitate prematurely the future, or to go back to ideas that are effete, the last being only the chrysalis form of the first. The state, "according to the idea of benevolence," belongs to the future. The regeneration of Christianity would consist in its becoming the vital and organizing power in the state, instead of being occupied solely, as heretofore, with the salvation of individuals. To this recent school of philosophy belong Weisse, Chalybœus, Wirth, and others.

FI'CHTĒ, JOHANN GOTTLIEB, an illustrious German philosopher, was b. at Rammenau, in upper Lusatia, 19th May, 1762. His earliest years were marked by a love of solitary musing and meditation. When a mere child, he was wont to wander forth to upland fields, that he might enjoy the pleasure of gazing into the illimitable distance. In 1775, he was placed at the gymnasium of Pforta, near Naumberg; and in 1780 he entered the university of Jena, where he devoted himself at first to theology, but afterwards to philosophy. During the years 1784 to 1788, he supported himself in a precarious way as tutor in various Saxon families. Subsequently, he went to Zurich in a similar capacity, where he made the acquaintance of the excellent lady who afterwards became his wife, Johanna Maria Rahn. In 1791, F. obtained a tutorship at Warsaw, in the house of a Polish nobleman. The situation, however, proved disagreeable, and was thrown up by the fastidious philosopher, who next proceeded to Königsberg, where he had an interview with Kant, of whom he had become an ardent disciple. Here he wrote, in 1792, his *Kritik aller Offenbarung* (Critique of all Revelation), which he showed to that philosopher, who praised it highly, but still maintained a certain air of reserve towards the enthusiastically earnest author, which pained the latter greatly. At Königsberg, F. was reduced to such straits for want of the means of subsistence, that he was forced to ask the loan of a small sum of money from Kant, which the latter was stoical enough to refuse. Things were now at the worst with F., and of course—according to the old adage—they began to mend. He entered the delightful family of the count of Krokow, near Danzig, as tutor, was enabled to marry; and in 1794, was appointed to the chair of philosophy at Jena, where he commenced to expound with extraordinary zeal his system of trancendental idealsm. F., in fact, *preached* his philosophy as if he believed its reception essential to the salvation of his hearers. In 1795 he published his *Wissenschaftslehre* (Doctrine of Science), in which he clearly broke away from Kant, whose speculations did not seem to him sufficiently thorough, or, as Eng-

lishmen would say, *idealistic*. Indeed, as early as 1793, writing to Niethammer, he says: "My conviction is, that Kant has only *indicated* the truth, but neither unfolded nor proved it." An accusation of atheism, which F. fervidly but fruitlessly refuted, cost him his chair in 1709. In the previous year, he published his *System der Sittenlehre* (System of Ethics, Jena, 1798), considered by many to be his most mature work. He now removed to Berlin, where he delivered lectures on philosophy to a select auditory. In 1800, appeared his *Ueber die Bestimmung des Menschen* (On the Destiny of Man). In 1805, he obtained the chair of philosophy at Erlangen, with the privilege of residing at Berlin in the winter. Here he delivered his celebrated lectures *Ueber das Wesen des Gelehrten* (On the Nature of the Scholar, Berlin, 1805–1806). In the same year appeared his *Grundzüge des gegenwärtigen Zeitalters* (Characteristics of the Present Age); and in 1806, his *Anweisung zum seligen Leben oder die Religionslehre* (The Way to the Blessed Life, or the Doctrine of Religion). But F. was a patriot as well as a philosopher. The victories of Napoleon at Auerstadt and Jena drew forth the famous *Reden an die Deutschen* (Addresses to the Germans). These addresses were full of the most exalted enthusiasm. F. "laments that his age has denied him the privilege accorded to Æschylus and Cervantes, to make good his words by manly deeds." The Prussian king appreciated the zeal of the eloquent metaphysician, and, on the restoration of peace, requested him to draw up a new constitution for the Berlin university. In 1810, the university was opened, with a host of brilliant names, F., Wolff, Müller, Humboldt, De Wette, Schleiermacher, Neander, Klaproth, and Savigny. By the votes of his colleagues, F. was unanimously elected rector. Here, as at Jena, he labored with unremitting energy for the suppression of all those customs which he deemed barbarous in themselves, and incompatible with the true idea of a scholar. In 1813, the war of independence broke out, and the hospitals of the Prussian capital were soon crowded with patients. F.'s wife was one of the first who offered her services as a nurse. For five months, she tended the sick with all the patient tenderness and devotion of her nature. At last, she was seized with fever, 3d Jan., 1814. After a fearful struggle, she recovered; but her husband caught the infection, and in spite of all remedies, sank under its influence, and died 27th Jan., 1814. It is difficult to speak calmly of Fichte. His life stirs one like a trumpet. He combines the penetration of a philosopher with the fire of a prophet, and the thunder of an orator; and ove all his life lies the beauty of a stainless purity. See *Fichte's Leben und literarischer Briefwechsel* (published by I. H. Fichte, 2 vols. Sulzb. 1830–31); and W. Smith's *Memoir*, published by Chapman and Hall (Lond. 1848). The fundamental notion of the idealism set forth in F.'s writings, at least in the earlier of them, is the sole reality of the *Ego* or I, which posits both itself and the *Non-ego*, or not-I. (The phrase "to posit," it ought to be observed here, signifies in German metaphysics, to present to the consciousness. Hence, when it is said that the *ego* posits itself, the meaning is, that the ego becomes a fact of consciousness, which it can only become through the antithesis of the *non-ego*.) Under this ego, however, must not be understood, according to the usual misapprehension, the human and finite, but the "absolute subject-objectivity" (*absolute subject objectivität*) the eternal, universal reason. The ego is the absolutely productive, which, however, would not attain to consciousness of itself—i.e., of its infinite spontaneous activity, did it not at the same time place in contrast to itself, and as an impediment (*anstoss*) and limit to its activity, the non-ego—i.e., the objective world, or nature. The ego, in so far as it is determined by the non-ego, is the intelligent ego, and, as such, the subject of theoretical science; the ego, on the other hand, as determining the non-ego, is the subject of practical science. Freedom, absolute, spontaneous activity, for its own sake, is not with F., as with Kant, the condition and pre-supposition of moral action, but is itself the highest expression of the problem of the moral law. To realize this self-activity, however, the ego requires an external world of objects, in order that in them as limits it may become conscious of its own activity. To this idealistic system of ethics it has been plausibly—some think unanswerably—objected that it makes the non-ego be required as the condition of morality, and at the same time represents the removal of this condition as the aim of moral effort. With respect to the idea of right, F.'s theory of freedom, in its fundamental principles, attached itself to the Kantian theory of freedom as the innate and primitive principle of right. Generally speaking, F. makes that which, from the stand-point of ordinary consciousness, we call the world, merely a product of the ego; it exists only through the ego, for the ego, and in the ego. F. himself afterwards modified or extended his system, so as to bring out more prominently the *theistic* character of his metaphysics. The transition to this later stage of F.'s philosophy is seen in his *Bestimmung des Menschen* (Destination of Man). It arose from the intense religiosity of his nature. F. was essentially a worshiping nature, and though he never ceased to be a philosopher, the untiring aspiration of his later years was to realize in his own way the belief of the great Jewish lawgiver: "The eternal God is thy refuge, and round thee are the everlasting arms." A popular exposition of his philosophy is given in his *Anweisung zum seligen Leben*. It is set forth in a strictly scientific manner in the lectures published in the *Nachgelassene Werke*, edited by I. G. Fichte (3 vols. Bonn, 1834–35), in which his *Speculative Logik* and his revised theory of right and morals are particularly deserving of attention. Although F. never, strictly speaking, formed a school, and though his system has only been adopted by a few, such as J. B. Shad, Mehmel,

Cramer, Schmidt, and Michaelis, his influence upon the subsequent development of German philosophy has been very important. F.'s collective works have likewise been published by his son, I. H. Fichte. His popular works have been translated into English by W. Smith, and published by J. Chapman of London in his "Catholic Series." Their titles are: *The Destination of Man; The Vocation of the Scholar; The Nature of the Scholar; The Way to the Blessed Life;* and *The Characteristics of the Present Age.*

FICHTELGEBIRGE, a mountain group of Bavaria forming the center from which three extensive mountain ranges proceed. The highest points are 3,490 and 3,340 feet. There is abundance of wood, as well as of iron, sulphur, vitriol, lead, copper, and many kinds of marble. The people are chiefly employed in mining and smelting. Objects of interest in the region are the celebrated watering-place of Alexandersbad, and the sandstone labyrinth of Luisenburg.

FICI'NO, MARSILIO, an illustrious philosopher of the Italian platonic school, was b. at Florence 1433. He was the son of the principal physician of Cosmo de' Medici; and to the liberality of this prince he owed the classical culture which inspired his future career. At the suggestion of Cosmo, F. undertook the translation of Plotinus, Iamblichus, Proclus, and Porphyry, besides a Latin but by no means literal version of Plato. In 1463, he was appointed by Cosmo president of a classical society or academy, founded in 1440, having for its aim the diffusion of the Platonic doctrines, which F. held to be the basis and confirmation of the Christian system. On the death of Cosmo, F. found a no less munificent patron in this prince's grandson, Lorenzo de' Medici; and having, at the mature age of 40, decided on entering the church, he was endowed by Lorenzo with the rectorship of two churches in Florence, and a canonry in the cathedral His theological doctrine, while undoubtedly sincere, presents a strange medley of incongruous views, the natural result of his attempt to fuse the philosophy of Plato with the Christian creed. He died in 1499, and was interred in the cathedral of Florence, where a monument commemorates his upright and manly qualities no less than his learning and philosophy, F.'s collected works were published at Basel (2 vols. f., 1491), and consist of translations from the Greek philosophers, and original metaphysical and theological compositions, of which we may mention the *Theologica Platonica, De Religione Christiana,* the Latin epistles, and a Commentary on the Epistles of St. Paul.

FICTION. See NOVELS.

FICTION OF LAW has been defined to be "a supposition of law that a thing is true, which is either certainly not true, or at least is as probably false as true."—Erskine, *Inst.* iv. 2, 38. Fictions have existed in all legal systems. They must be regarded as a species of legal fraud, which has been tolerated as enabling individuals who, by the strict letter of the law, would have been excluded from obtaining redress of evils, to procure that remedy by a pious fraud. There are two general maxims which regulate the application of fictions—viz., that no fiction shall be allowed to operate a wrong, and that no fiction shall be admitted which in the nature of things is impossible. The Roman form of judicial procedure abounded with fictions, by which alone, in many cases, a party aggrieved could enforce his right. Thus, an heir, unjustly disinherited, by the *querela inofficiosi testamenti,* feigned that his father had been mad. A stranger in Rome, who had been robbed, could not obtain restitution without the *fictio civitatis,* whereby he feigned himself a citizen. Many of the fictions existing in Rome have found a counterpart in modern systems; thus, the *fictio longæ manus,* whereby lands at a distance were feigned to be delivered, resembles an English feoffment at law. In like manner, the *fictio traditionis symbolicæ* of keys of a warehouse to give possession of the articles contained therein, and of a deed in confirmation of the covenants contained therein. The *fictio unitatis personarum* was the original of the Scottish fiction, that the heir is *eadem persona cum defuncto.* But in no system of law have fictions been so liberally adopted as in that of England. It is by means of fictions alone that the original limited jurisdiction of the courts of Queen's bench and exchequer has been extended to ordinary suits. In the latter court, every plaintiff assumed that he was a debtor to the crown, and was debarred from discharging his obligation by the failure of the defendant to satisfy his demand; in the former, it was assumed that the defendant had been arrested for some supposed trespass which he had never in fact committed. The fictitious character of John Doe and Richard Roe long contributed to make the action of ejectment famous. And though these fictions have disappeared before the ruthless hand of modern legislation, yet to this day, in an action at the instance of a father for the seduction of his daughter, damages can only be awarded on the assumption that she was his servant, and that he has suffered pecuniary loss by deprivation of her services. In chancery, again, the whole doctrine of uses and trusts is based upon a fiction. Perhaps the best explanation of the introduction of fictions into legal systems is to be found in Dr. Colquhoun's *Summary of the Roman Civil Law,* 2027. It involves, he says, "less difficulty to adhere to known and admitted forms, and gradually to accommodate them to the changed state of society, than to upset all the incidents connected with them by a sudden change, which must ever tend to unsettle the law and practice of the courts. All nations have therefore found it more desirable to let the one glide into the other, than to adopt any abrupt measure which might disturb the practice and effect of former decisions."

In the law of Scotland, fictions of law are not of frequent occurrence. For the benefit of creditors, the principle that the heir is *eadem persona cum defuncto* is admitted; and in an action of "reduction-improbation" of a deed, it is assumed that the document was false, whether the fact be so or not. But in general the legal system of Scotland has shown a facility of adapting itself to the circumstances of the case, and that without producing the alarming results which presented themselves to the imagination of Dr. Colquhoun.

FICUS. See FIG.

FID (from the Lat. *findere, fidi*, to divide), for splicing ropes, is a large pointed pin, with an eye at the thick end, of iron or lignum vitæ, used by sailors in separating and interlacing the strands of which the rope is composed.

A *mast-fid* is a bolt inserted through the bottom of a ship's topmast or top-gallant-mast, with ends resting on the trestle-trees sustained by the head of the lower mast or topmast. Unless the mast-fid be withdrawn, the supported mast cannot be lowered.

FIDDEMIN, one of the handsomest villages of the Fayûm, inhabited by a Mussulman and Coptic population. It is surrounded by fruit-trees, and is remarkable for a large olive, supposed to be the original one planted in Egypt, and yielding annually 268 lbs. of olives.—Clot Bey, *Aperçu générale sur l'Egypte* (8vo, Paris, 1840), vol. i. p. 213.

FIDDLE. See VIOLIN.

FIDEICOMMISSUM, in the civil law, was a conveyance of property in trust to be transferred to a third person named by the truster. *Fideicommissa*, when first introduced, were not supported by the law. The performance of them depended, therefore, on the conscience of the party intrusted, and they were consequently frequently not carried out. They were originally adopted for the purpose of conveying property either where a party, from the circumstances of the case, as inability to procure the proper number of witnesses, was prevented from executing a will; or where he desired to benefit those who, by law, were precluded from taking the property. To effect this purpose, an actual conveyance was made to a friend, coupled with a request that the property should be transferred to another. Fideicommissa having thus been introduced for a special purpose, were by degrees extended to conveyances of the whole inheritance, and finally were used for the purpose of settling estates in a particular order of succession, forming the earliest instance of entails (q.v.). Fideicommissa first received the sanction of positive law in the reign of Augustus, by whom authority was given to the prætor to enforce the performance of these fiduciary obligations.—*Institutes*, ii. 23, s. 1. The emperor Claudius subsequently extended this authority to the consuls and presidents of provinces. Fideicommissa were either *particular* or *universal*, the former being a bequest of a particular subject, or a part only of the inheritance; the latter comprehended the whole estate

In *Holland*, the principles of the civil law as to fideicommissa form an important branch of the law in regard to landed estates. An heir may be required to transfer either the whole or a portion of his inheritance. The provisions of the senatus-consultum trebellianum also have been adopted; but if an heir resist the intentions of the testator, and is compelled by law to execute the trust, he is not allowed to take the benefit of these provisions. The benefit also may be excluded by express direction in the will. Children who have received their legal portions, and are required to transfer to a stranger the rest of the inheritance, are entitled to retain a fourth part for themselves. Grotius, *Dutch Jurisprudence*, by Herbert, b. ii. c. 20.

FIDI'CULA, a small musical instrument in the shape of a lyre.

FIEF. See FEUDAL SYSTEM.

FIELD. In heraldry, the field is the whole surface or continent of the escutcheon or shield. It is so called, according to some, because it represents the field of battle on which the achievements or charges represented on it are supposed to have been gained. In blazoning, the tincture or metal of the field must be the first thing mentioned.

FIELD, CYRUS WEST, an American merchant, one of a family distinguished for ability, was b. at Stockbridge, Mass., Nov. 30, 1819. At the age of 15, he went to New York, and entered upon a commercial career, which he pursued with such energy and success that he was enabled, in 1853, to partly retire from business, to spend some time in South American travel, and then to engage with great enthusiasm in the promotion of the Atlantic telegraph, for which he secured a charter from the colonial government of Newfoundland for 50 years. Being joined by Peter Cooper, Moses Taylor, and other American capitalists, he organized, in 1854, the New York, Newfoundland, and London telegraphic company; and in 1856, the Atlantic telegraph company. Devoting himself entirely to the work of uniting the old and new worlds, he crossed the ocean nearly 30 times in its prosecution; and on the laying of the first cable, 1858, was received by his countrymen with enthusiastic plaudits. He continued his exertions; and on the success of the cable of 1865, received a gold medal at Liverpool, and a vote of thanks from the American congress. In 1871, F. was one of the originators of the company which undertook to lay a cable across the Pacific ocean *viâ* the Sandwich islands to China and Japan. See ATLANTIC TELEGRAPH.

FIELD, CYRUS WEST (*ante*), b. Stockbridge, Mass., 1819; brother of David Dudley. He left his home at the age of 15 to enter a mercantile house in New York, and a few years later was the head of a prosperous concern. Retiring from business in 1853, he traveled for seven months in South America with Mr. Frederic E. Church, the artist, and on his return was applied to for aid in building a telegraph line in Newfoundland —an undertaking which had been begun, but had proved a total failure. The plan was to carry the line across that island to St. John's, the furthest point on the American coast, and there connect with a line of fast steamers, which, it was thought, could reach the nearest point in Ireland in five days. Thus America could be brought easily within a week of Europe. While Mr. Field was considering this proposal, and turning over the globe in his library, the thought flashed upon him, "Why not carry the line across the ocean?" In this was the germ of that project of an Atlantic telegraph to which he was to devote the next 13 years of his life. Having obtained, in 1854, from the legislature of Newfoundland, the exclusive right for 50 years of landing telegraph cables from Europe and America on the island, he formed a company known as the "New York, Newfoundland, and London Telegraph Company." In 1856, he went to London and organized the "Atlantic Telegraph Company." Mr. Field furnished one fourth of the capital, and the United States and British governments provided ships for the undertaking. The expeditions of 1857, the two of 1858, and those of 1865 and 1866 were mainly due to his efforts of organization, for although the first two were failures, and the cable laid by the third worked but four weeks, he never lost faith in the enterprise. In 1866, however, a cable was finally laid, and the cable of 1865 was picked up in mid-ocean by the Great Eastern, joined to the cable on board, and the western terminus was safely landed.

The success was complete, and in both countries honors were showered upon the leaders of the expedition. In England several were knighted, and others made baronets; and the prime minister, in conferring these rewards, said that the only reason why Mr. Field was not included in them was that it was felt that any title or dignity might not be acceptable to an American citizen. But he had honors enough at home. Besides innumerable congratulations, he received the unanimous thanks of congress, with a gold medal, and other testimonials for what was recognized as one of the most remarkable achievements of the century. The French exposition of 1867 awarded him the grand medal, its highest award, given only to those who were recognized as great public benefactors.

Since then, while enjoying the fruits of his chief work, he has not been idle in other directions. He has taken interest in the different submarine cables in the Mediterranean and in the east. Within the last three years he has devoted much of his thought and of his capital to the establishment in New York of the system of elevated railroads, which have supplied a want long felt, and proved an inestimable blessing to the city. He has still one more dream of his life, to lay a telegraphic cable across the Pacific, and thus complete the circuit of the globe. See ATLANTIC TELEGRAPH.

FIELD, DAVID DUDLEY, D.D., 1781–1867; born in East Guilford, now Madison, Conn.; graduated from Yale college in 1802; studied for the Congregational ministry, and in 1804 was settled at Haddam, on the Connecticut river; in 1818, was called to Stockbridge, Mass.; in 1837, he was recalled to his old parish in Connecticut, where he spent the last fourteen years of his active ministry. In 1851, having reached the age of seventy, he returned once more to Stockbridge, and there passed the evening of his life, greatly respected as one of the most venerable ministers of New England. He was the author of several local histories, such as that of Middlesex co., Conn., and of the city of Middletown; of Berkshire co., Mass., and of the town of Pittsfield; and of a genealogy of the Brainerd family. He also published a number of sermons.

FIELD, DAVID DUDLEY, b. Haddam, Conn., 1805; an eminent lawyer; son of David Dudley, D.D. He graduated at Williams college in 1825, studied law, and was admitted to the bar in 1828. He commenced practice in New York, where he has been a conspicuous figure at the bar for more than fifty years. Besides a very large professional practice, he devoted all the time which he could spare from pressing engagements for forty years to the reform of the law. He began the movement by writing articles in reviews and papers and pamphlets, showing the urgent necessity of reconstructing the modes of legal procedure. Having been appointed in 1847 a commissioner on practice and pleadings by the legislature of New York, he devoted himself first to the preparation of a code of civil procedure. The design of the new system of civil procedure was to wipe out the distinction between the forms of action, and between legal and equitable remedies, in order that all the rights of the parties in relation to the subjects of litigation could be decided in a single action, instead of dividing them, as formerly, between different suits. This system has been adopted in 24 states and territories, and has been substantially followed by Great Britain and many of her dependencies. The same commission framed a code of criminal procedure, which has been adopted by 15 states and territories. In 1837, Mr. Field was placed at the head of a new commission to prepare a political code, a penal code, and a civil code, which were finished and reported, but have not been adopted by the state of New York, though the civil and penal codes were passed by the two houses, almost unanimously, in 1879, and failed only for want of the governor's

signature.]» They have been of great service, however, in the legislation of other states, especially in California, where they were adopted with a few alterations that were necessary in order to adapt them to the condition of that state. In 1866, the British association for the promotion of social science held a meeting at Manchester, at which Mr. Field made a proposal for a general revision and reform of the law of nations, similar to that aimed at in his labors for the reform of the civil and criminal law. Acting on his proposal, he completed, in 1873, a work entitled *Outlines of an International Code*, which he presented to the social science congress of that year. It met with very favorable criticism from eminent jurists all over the world.

In 1873, he was elected first president of an association for the reform and codification of the law of nations, formed at Brussels in that year. This association has for one of its great objects the substitution of arbitration for war in the settlement of disputes between nations.

FIELD, HENRY MARTYN, D.D., b. Stockbridge, Mass., 1822; brother of David Dudley. After graduating from Williams college, he studied theology, and was ordained pastor of a Presbyterian church in St. Louis in 1842. He resigned this position in 1847 to go abroad, and spent a year in Europe. 1848 was the year of revolutions. He was in Paris during the three days of Feb. when Louis Philippe was overthrown, and wrote a very full description of the scenes of which he was an eye-witness. On his return he published also a sketch of the Italian revolutions, and a letter from Rome on *The Good and the Bad in the Roman Catholic Church*. At this time he wrote *The Irish Confederates: a History of the Rebellion of* 1798. In 1851, he was settled as pastor of a Congregational church in West Springfield, Mass., and in 1854 removed to New York, to become one of the editors of *The Evangelist*, a well-known religious journal, of which he is now sole proprietor. After making a second tour in Europe in 1858, he published *Summer Pictures: from Copenhagen to Venice;* and in 1866, he issued *The History of the Atlantic Telegraph*. In 1867, he was a delegate to the Free church of Scotland and the Presbyterian church of Ireland, and visited the great French exposition. In 1875–76, he spent a year and a quarter in a tour around the world, which furnished the material for two volumes, *From the Lakes of Killarney to the Golden Horn*, and *From Egypt to Japan*, which have had a remarkable popularity.

FIELD, JOHN, 1782–1837; an English pianist and musical composer, a pupil of Clementi, whom he accompanied on a concert tour through Europe. In Russia, after separating from Clementi, he was remarkably successful, but his extravagance kept him always poor. An unhappy marriage with a French lady was speedily dissolved. He was not a prolific writer, but he left many works not easily forgotten. His nocturnes need no other claim to immortality than the fact of their being the inspiration on which Chopin worked.

FIELD, JOSEPH M., d. 1856; an actor and dramatist, b. England, but for many years a resident of New Orleans, where he produced a number of plays. He was widely known as "Straws," a humorous writer on the *New Orleans Picayune*, and later as an editor in St. Louis. He was the father of Kate Field, the actress and lecturer of the present day. He published *The Drama in Pokerville*.

FIELD, KATE, b. St. Louis, daughter of Joseph M. She was educated in Massachusetts and in England, and at an early age became known as a correspondent for American newspapers and a writer for magazines. In 1874, she appeared on the stage in New York as "Peg Woffington," but with indifferent success. She was more successful as a lecturer. Recently she has passed most of her time abroad, where she has been received with much honor; but in 1880 is endeavoring to establish in New York a co-operative system for ladies in the purchase of dress goods. She is a facile and interesting writer.

FIELD, STEPHEN JOHNSON, b. Haddam, Conn., 1816; brother of David Dudley. At the age of 13 he made a voyage to the east in company with a brother-in-law, who was a missionary, and he spent three years in Smyrna and Athens, studying Greek and other languages. Returning to this country, he graduated at Williams college, in 1837, with the highest honors. He then studied law in the office of his brother in New York, and, after his admission to the bar, became his partner until 1848, when he went abroad and passed a year in Europe. On his return, in 1849, he joined in the emigration then just beginning to California, settled at a place where now stands the city of Marysville, and was elected the first alcalde, holding the office until the organization of the judiciary under the constitution of the state. Under Mexican law an alcalde had a very limited jurisdiction; but after the American occupation the jurisdiction exercised by him in the anomalous condition of society in California at that time was practically unlimited. In 1850, he was elected to the legislature, and was placed on the judiciary committee. He drew up a bill defining the powers of the courts of justice and judicial officers of the state, which was passed, and most of its provisions are still retained in the code. He secured also the passage of a law giving effect to the usages and regulations adopted by the miners for the protection and working of the mines. The principle embodied in this law was adopted in other mining regions of the country, and finally by the congress of the United States. In 1857, he was elected

judge of the supreme court of California, and in 1859 he succeeded David S. Terry as chief-justice. When Mr. Field came to the bench, the titles to lands in the state were unsettled, and it is principally by decisions in which he delivered the opinions of the court that the law of real property in California has been placed on a permanent basis. He was appointed in 1863, by president Lincoln, an associate justice of the supreme court of the United States, which position he still holds. The opinions of the court in the celebrated test-oath cases, written by him, and his dissenting opinion in the legal-tender cases, attracted general attention. In 1869, he was appointed professor of law in the university of California; in 1873, as one of a commission to examine the codes of the state, he prepared amendments which were adopted by the legislature. He was a member of the famous electoral commission of 1876 which decided the presidency in favor of Rutherford B. Hayes; and voted with the minority in favor of Samuel J. Tilden. His recent opinions in the Virginia jury cases, and the cases arising under the election laws of congress, have been the subject of much discussion throughout the country.

FIELD-ALLOWANCE, a daily allowance granted to officers of the British army in consideration of extra expense entailed upon them in consequence of military operations. *Ordinary* field-allowance, ranging from £1 10*s.* for a general officer to 1*s.* for a subaltern, is applicable when troops are encamped at home or in the colonies. *Extraordinary* field-allowance is sanctioned when and wherever troops are engaged in actual warfare: it ranges for the above ranks from £2 10*s.* to 1*s.* 6*d.* Strict rules are laid down that no officer shall receive this allowance unless positively present with the army.

FIELD OF THE CLOTH OF GOLD, a plain near Guisnes, in the department of Calais, France, where Henry VIII. of England and Francis I. of France held a conference in June, 1520. The throne of France was sought for by Charles I. of Spain (afterwards Charles V.), and Francis sought the friendship of the English king. To bring about such a result Francis proposed to raise cardinal Wolsey to the papacy. Wolsey brought about and conducted the meeting, which was attended with so much splendor of pageantry as to give the peculiar title to the place. In the opening of *Henry VIII.* Shakespeare gives the following vivid description of the event:

Buckingham. An untimely ague
Stay'd me a prisoner in my chamber when
Those sons of glory, those two lights of men,
Met in the vale of Andren.
Norfolk. 'Twixt Guynes and Arde:
I was then present, saw them salute on horseback;
Beheld them, when they lighted, how they clung
In their embracement, as they grew together;
Which had they, what four throned ones could have weigh'd
Such a compounded one?
Buckingham. All the whole time
I was my chamber's prisoner.
Norfolk. Then you lost
The view of earthly glory: men might say,
Till this time pomp was single, but now married
To one above itself. Each following day
Became the next day's master, till the last
Made former wonders its. To-day the French,
All clinquant, all in gold, like heathen gods,
Shone down the English; and, to-morrow, they
Made Britain India: every man that stood
Show'd like a mine. Their dwarfish pages were
As cherubims, all gilt: the madams too,
Not used to toil, did almost sweat to bear
The pride upon them, that their very labor
Was to them as a painting: now this masque
Was cried incomparable; and the ensuing night
Made it a fool and beggar. The two kings,
Equal in lustre, were now best, now worst,
As presence did present them; him in eye,
Still him in praise: and, being present both,
'Twas said they saw but one; and no discerner
Durst wag his tongue in censure. When these suns—
For so they phrase 'em—by their heralds challenged
The noble spirits to arms, they did perform
Beyond thought's compass; that former fabulous story,
Being now seen possible enough, got credit,
That Bevis was believed
Buckingham. O, you go far.
Norfolk. As I belong to worship and affect
In honour honesty, the tract of everything
Would by a good discourser lose some life,
Which action's self was tongue to. All was royal;
To the disposing of it nought rebell'd,
Order gave each thing view; the office did
Distinctly his full function.

The solemnities occupied nearly three weeks. Ten days were spent in the feats of arms for which Wolsey had provided. There were tilting with lances, and tourneys on horseback with the broadsword, and fighting on foot at the barriers. The kings were always victorious against all comers. On midsummer day the gaudy shows were over.

FIELDFARE, *Turdus pilaris,* a species of thrush (q.v.), in size about equal to the blackbird, but with greater length of wing; the general color gray, the feathers tipped with a brownish black elongated spot; the throat and breast reddish yellow, streaked and spotted with black; the forepart of the back and wings of a rich brown color; the tail slightly forked and nearly black; the under parts white. The F. is a very common winter visitant of Britain, although it rarely breeds even in the northern parts of the island. It arrives from more northern regions when the winter has fully come, and departs again towards the end of spring. It is well known to youthful sportsmen, and affords much employment for their guns during the Christmas holidays, when it may generally be found in small flocks—often along with its smaller congener, the redwing—in fields, if the weather is mild, feeding on worms, snails, etc., or, in severe weather, about hedges, thickets, and woods, wherever haws and other such fruits or seeds are abundant. Its winter migrations extend southward as far at least as the islands of the Mediterranean. It is one of the summer songsters of the n. of Europe and of Siberia; its song is soft and melodious, but is much less familiar to us in Britain than its call-note, which is harsh. It is extremely plentiful in Norway, where its nests are very generally built in spruce firs, and, contrary to the ordinary habits of thrushes, in society; numerous nests being often to be found in the same tree, and "two hundred nests or more being frequently seen within a very small space." The F. is easily tamed, and sings well in captivity.

FIELD-GLASS is the lens usually interposed between the object-glass and eye-glass of a microscope, which, receiving the diverging rays from the former before they form an image, contracts the dimensions of the image, and increases its brightness, so as to render it of a proper size and degree of distinctness for being viewed by means of the eye-glass. See FIELD OF VIEW, and MICROSCOPE.

FIELDING, COPLEY VANDYKE, an English painter in water-colors, was b. about 1787, and began to exhibit in 1810. For many years he held the office of president of the society of painters in water-colors, and was generally recognized as the representative of that branch of art in England. He died at Worthing, in Sussex, Mar. 3, 1855, in his 68th year, and after a career of steady prosperity. Possessing remarkable mechanical dexterity and knowledge of effect, F. painted with what severe critics would call fatal facility. He contributed about a score of pictures annually to the exhibition of the water-color society. But, to do him justice, he always exhibited a certain easy finish of treatment, which was perhaps of itself a kind of secondary talent. Although his range of subjects was but limited, yet within it he was almost unrivalled. As a painter of marine effects, and of the landscapes of down and glade, it is thought by many that he has had as yet no equal.

FIELDING, HENRY, b. April 22, 1707, was the son of gen. Edmund Fielding, connected with the earls of Denbigh. He was sent to Eton, and was afterwards transferred to the university of Leyden, to prosecute legal studies. Returning to London, he began to write for the stage, and worked with so much industry that between 1727 and 1736, he produced nearly a score of comedies and farces, which were forgotten with nearly as much speed as they were produced. He married in 1736, and falling heir to a small estate, he, with his young wife, retired from London. But his was not a Fortunatus's purse, and his hand was continually in it; and in three years after his marriage, he was back in London a student at the temple. He was called to the bar at the usual time, but gout intervening, steady practice was rendered impossible. Happily, a way of escape was at hand. Richardson published *Pamela;* the town was ringing with it; and F., whose strong, healthy, unconventional nature revolted from the moral priggishness of "Virtue Rewarded," resolved to write a counterpart, purporting to be the adventures of Pamela's brother, *Joseph Andrews.* This work, begun in a satirical mood, and intended merely to quiz Richardson, deepened as it proceeded, and flowered out into humorous adventure. The exquisite character of parson Adams took the world by surprise, and remains one of the permanent glories of English fiction. The next important work undertaken by him was *Jonathan Wild,* a masterpiece of irony, which has never been sufficiently appreciated, and which doubtless suggested to Mr. Thackeray the scope and conduct of *Barry Lyndon.* The rebellion of 1745 induced F. to undertake the direction of the *Jacobite Journal,* in support of the Hanoverian succession; and shortly after, as a reward for his loyalty, he was, through the influence of lord Lyttelton, promoted to a pension, and to the place of justice of the peace of Middlesex and Westminster. While engaged in magisterial duties, he produced *Tom Jones,* his most famous fiction, which the world has never ceased to read, nor critics to admire. His next work was *Amelia*—less striking and masterly than its predecessor, but quieter in style, and enriched with scenes of domestic tenderness. Shortly after its publication, he was attacked by dropsy, jaundice, and asthma, a complication of disorders which baffled the skill of the physicians. Seeking relief, he left England for Lisbon on the 26th June, 1754, and died there on the 8th Oct. of the same year, at the early age of forty-seven.

F. was the first great English novelist, and he remains to this day one of the greatest. *Tom Jones* is a miracle of invention, character, and wit. It contains the most amusing scenes and adventures, the most sparkling delineations of life, high and low, the most

abundant satire. Everywhere, the author's manliness, shrewd sense, and scorn of meanness and hypocrisy, are apparent. If defects may be hinted, it may be said that F.'s nature was more robust than delicate; that it was deficient in the sentimental and poetic side; and, as a consequence, that his ideal of woman is not high, and his descriptions of the tender passion either commonplace or extravagantly rapturous. The love-scenes between Tom and Sophia, and the episode of the "Man of the Hill," which is meant to be passionate and poetic, are perhaps the only portions of the great novel which readers skip. It is to be regretted that all F.'s works are disfigured by coarseness of circumstance and expression; but that was the fault of the time as much as of the man. He was coarse, as he wore ruffles, drank claret, and hated the pretender. He set himself to paint society as he saw it, and we must forgive the coarseness for the truthfulness of the picture.

FIELD-MARSHAL, the highest rank of general officers in the British and some foreign armies. In the former, it is a special honor enjoyed by very few officers, and only conferred by selection, either on the ground of distinguished service or of royal birth. When unemployed, the field-marshal has no higher pay than any other gen., but if commanding an army, he receives £16 8*s.* 9*d.* a day for staff-pay, while a gen. has but £9 9*s.* 6*d.* The equivalent rank in the navy is that of admiral of the fleet. Formerly, a capt.gen. was occasionally appointed, who had rank higher even than a field-marshal.

FIELD-MOUSE, a name popularly given to certain species both of MOUSE and of VOLE. See these articles.

FIELD-OFFICERS, in the army, are such as are competent to command whole battalions—viz., majs., lieut.cols., cols.—in contradistinction to those merely intrusted with company duties, as capts., lieuts., and sublieuts.

FIELDS, JAMES THOMAS, b. N. H., 1817; educated in a high school in Portsmouth, and became a clerk in a book-store in Boston. In his 18th year, he read the anniversary poem before the Boston mercantile library association, on which occasion Edward Everett delivered the oration. In 1848, before the same society, he delivered another poem, *The Post of Honor*, Daniel Webster being the orator. He is widely known as a member of the successive publishing houses of Ticknor, Reed, and Fields; Ticknor and Fields; and Fields, Osgood, and Co.; for 25 years, to 1871. He collected and issued De Quincey's works in 21 volumes. In 1849, 1854, and 1858, respectively, he printed volumes of his poems for private distribution. He edited *The Atlantic Monthly* from 1862 to July, 1870; has repeatedly visited Europe, and has had wide acquaintance with literary men abroad. He has also lectured in the United States, and published *Yesterdays with Authors*, in which are many anecdotes of literary men.

FIELD-TRAIN, a department of the royal artillery, consisting of commissaries and conductors of stores, responsible for the safe custody of the ammunition, for the formation of proper depots of shot, etc., between the front and the base of operations, and that a due proportion shall be constantly at the service of each gun during an engagement.

FIELD OF VIEW is the whole space within which objects can be seen through an optical instrument; more strictly, it is the space within which the image of an object may be seen by whole pencils. That part of the image which is seen by partial pencils of the light from the object speculum or lens is called the *ragged edge*, and usually a diaphragm is employed to cut it off from the view of the observer altogether.

FIELD-WORKS are intrenchments and other temporary fortifications thrown up by an army in the field, either as a protection from the onslaught of a hostile force, or to cover an attack upon some stronghold. Field-works will be more particularly described under the article fortifications (q.v.).

FIERDING COURT (Fierding Thing), a district court in use among the early Gothic nations. This court was established for the purpose of rendering speedy justice in small matters. There were four of these courts in every hundred, each presided over by a separate judge, whose jurisdiction extended to all causes where the matter in dispute did not exceed the sum of three marks. Stiernhook, *De Jure Goth.*, lib. i. c. 2.

FI'ERI FA'CIAS, WRIT OF, an English writ for enforcing the judgment of a court of law against the goods of a debtor. It may be sued out as soon as final judgment has been signed, or, in case of a trial out of term, in fourteen days after verdict, unless, on special cause shown, a judge order speedy execution. But a writ of F. F. cannot be enforced after a *capias ad satisfaciendum* (q.v.) has been issued. The sheriff, in executing this writ, may not break open doors; but having obtained peaceable entrance, he may break open inner doors, cupboards, and trunks. The officer in execution having taken possession, may leave an assistant in charge, by whom an inventory of the goods is made. He is entitled to remain on the premises a reasonable time in order to remove the goods; but if he continue longer without permission of the owner, he is liable to an action for trespass. By 8 Anne, c. 14, if goods are removed from land or premises let on lease, the party removing them must pay the rent and taxes. A creditor may not take, in execution, manure, hay, etc., where, by the covenants of the lease, the tenant

is prohibited from removing them (56 Geo. III. c. 50). Growing crops, if seized in execution, and sold, are liable for rent accruing after the date of the seizure, as long as they remain on the ground (14 and 15 Vict. c. 25). By 1 and 2 Vict. c. 110, money, bank notes, bills of exchange, and other securities, may be taken under a writ of fieri facias. By 8 and 9 Vict. c. 127, a creditor is not entitled to take wearing-apparel and bedding or tools where the value of the whole does not exceed £5. Such fixtures as belong to the heir, and not to the executor, cannot be taken under this writ. The goods of the party only who is named in the writ may be seized; and if the officer take goods belonging to a stranger, he is liable to an action for damages. By 1 and 2 Vict. c. 110, decrees in chancery have the effect of a judgment in a court of law. In Scotland, the corresponding process for seizing and selling a debtor's goods is a warrant to poind the movables. See POINDING.

Fieri facias de bonis ecclesiasticis is a writ directed to the bishop of the diocese, requiring him to attach the ecclesiastical goods of a clergyman within his diocese, in satisfaction of the judgment of a court of law.

FIES'CHI, Count GIOVANNI LUIGI, a member of one of the most illustrious houses of Genoa, was b. about the year 1523. In addition to the luster of ancestral fame, his name has attained a tragic historical celebrity in connection with a remarkable conspiracy of which he was the chief. Andrea Doria, a famous admiral, sprung from a race hereditarily at feud with that of F., having expelled the forces of Francis I. from the state, had restored the republican form of government, but at the same time, by his vigorous administration, effectually held in check the ambition of the nobles. Count F. organized a plot, having for its object the death of Doria, and his nephew Gianettino, the object of F.'s special hatred, and the establishment of an oligarchic form of government. Instigated by the approval of France and Rome, and supported by an alliance with the duke of Parma, F. speedily enrolled a formidable array of accomplices, his three brothers among the foremost. Crowds of his own feudal retainers were secretly armed and assembled from the various hereditary lands of the house; three galleys, purchased with the connivance of the pope, were fully equipped; and all being in readiness, the attempt was fixed for the 2d of Jan., 1547. Doria, in spite of repeated warnings, refused to ascribe treacherous or subversive designs to F., whom he regarded as a fast friend and partisan. Complete success seemed at first to crown the conspirators; the gates of the city were forced, the fleet captured, Gianettino assassinated, Doria in flight. F. had but to appear and dictate, but he was nowhere to be found; and the strangest episode of this wild drama is the sudden disappearance of its hero. In stepping from one galley to the other in the darkness of night, F. stumbled, and falling overboard, was borne down by his ponderous armor, and miserably drowned in the harbor, or, according to some, stifled in the slime.

FIESCHI, JOSEPH MARCO, known by his attempt on the life of king Louis Philippe, was b. in Corsica in the year 1790. His early life contains nothing of note. A profligate career appears to have reduced him to great poverty about the year 1835, when he conceived the idea of assassinating the king. The immediate cause of his diabolical design was the suppression of a situation which he held, by order of the prefect of the Seine. Disguising his crime under the cloak of political enthusiasm, he leagued with himself one or two obscure persons, of pot-house politics, who hated the government of the citizen king. These were Pierre Morey, a saddler; Pepin, a grocer; and Victor Boireau, a maker of lamps. F. sketched the plan of an infernal machine with twenty barrels, that could be simultaneously discharged; got one made, and placed it in a house of the Boulevard-du-Temple. The review of the national guard held there, 28th July, 1835, afforded F. the opportunity he desired. On the approach of the king and queen, he fired his machine. Eighteen people were killed, among whom was marshal Mortier, who fell dead beside his sovereign. Louis Philippe, however, himself escaped with a mere scratch, and was able to continue the review. F. was immediately seized, and along with his accomplices, was tried, condemned, and executed, 16th Feb., 1836.

FIE'SOLE (anciently, *Fæsulæ*), one of the most ancient Etruscan cities, is situated on the crest of a hill, at about three miles' distance from Florence, of which it may be said to be the parent city. From the heights of F., the view presented by Florence and the neighboring valleys is gorgeous in the extreme. We find F. first mentioned in 225 B.C. during the great Gaulish war. Hannibal encamped here after crossing the Apennines. The city was next destroyed by Sulla in the social war (90–89 B.C.), who afterwards despatched thither a military colony. At the invasion or Tuscany by the Goths, F. also fell under their dominion, and being by nature and art a formidable stronghold, was numerously garrisoned by the barbarians. The growth of Florence during the middle ages gradually reduced it to insignificance. It is now a place of about 2,500 inhabitants. The only vestige of Etruscan structures still remaining is the cyclopean city wall, constructed of huge blocks of stone, many portions of which are wonderfully perfect. The site of the Etruscan fortress is now occupied by a convent, and interesting fragments of the foundations are often brought to light. The amphitheater and other remains belong to the Roman age. The very ancient church of St. Alexander, supposed to have originally served as a pagan temple, contains an altar dedicated to

Bacchus, the inscription of which is, however, illegible, owing to a fissure in the middle. Coins and other relics have been repeatedly dug up.

FIESOLE, Fra Giovanni da, one of the most eminent regenerators of Italian art, also known by the title of *Il beato Angelico,* was b. at Mugello in 1387. In 1407, he entered the Dominican order, and, together with his brother, consecrated his artistic abilities exclusively to sacred aims, illustrating various works of devotion with beautiful miniature designs. These early artistic efforts are remarkable for their rich effects of coloring, gorgeous illumination, and exquisite elaboration of the most minute ornamental details. Having achieved a high reputation as fresco-painter by some noble compositions with which he endowed his own and other convents, he was commissioned by Cosmo de' Medici, with the decoration of the church of Santa Annunziata and the convent San Marco. Each cell of the convent was adorned with a fine fresco of large dimensions, and amidst other paintings, one can still distinguish F.'s "Annunciation." The fame of this work induced pope Nicholas V. to summon him to Rome, and intrust him with the execution of a series of illustrations taken from the life of St. Laurence, destined to embellish the private chapel of St. Laurence in the Vatican. See Giangiacomo Romano, *Le Pitture della Cappello di Nicolò V.*, etc., (Rome, 1810). So rigid a disciplinarian was F., that no private or public work was ever undertaken without the formal consent of his superiors being obtained, and to them all pecuniary remuneration was transferred. The archbishopric of Florence, spontaneously offered him by the pope, was humbly declined. He died in Rome in 1454. The gallery of Florence possesses several pictures of F., still undimmed in brilliancy of coloring. One of these, the "Birth of John the Baptist," is a conception full of simple and winning grace. Some of the largest easel-compositions of this artist at present adorn the gallery of the Louvre; among those in the antechamber are the "Coronation of the Virgin," and the "Miracles of St. Dominico." One supreme aim pervades all the creations of F.—that of arousing lofty devotional feeling through the contemplation of the beautiful in art.

FIFE, an ancient wind-instrument of military music, in which the melody is produced by blowing through a hole in a reed or tube, while the escape of air is regulated by the fingers stopping or opening a number of other holes in different parts of the pipe. It has a compass of two octaves, from D on the fourth line of the treble clef to D above in altissimo. The fife figures in the sculptured memorials of the Argonautic expedition, and from that time to this has maintained its place as a simple yet effective instrument for martial purposes. It was common with English troops till the reign of James I., but was then discontinued; to be re-introduced by the duke of Cumberland at the siege of Maestricht in 1747. It is a universal favorite in the navy, and many a stirring air on drums and fifes has cheered the British sailor to deeds of daring.

In the infantry, there is a *fifer* to each company, and a fife-major to each battalion, the former receiving the daily pay of 1*s.* 1*d.*, the latter, who is a non-commissioned officer, 1*s.* 11*d.*

FIFE-NESS, a promontory of Scotland, the eastmost point of Fifeshire, in lat. 56° 17′ n., and long. 2° 35′ west. On the n., in the sea, are the dangerous Carr rocks, with an iron beacon 35 ft. high, which required six years to construct. F. is in view of the Isle of May and Bell Rock lights. In the Ness, trap rocks jut through the carboniferous strata, and the rocks contain small caves.

FIFESHIRE, a maritime, almost peninsular co. of the e. of Scotland, between the Firth of Forth on the s. and the Firth of Tay on the north. It is 44 m. in extreme length from n.e. to s.w., and 18 at its greatest breadth; area, 503 sq.m.; coast-line, 85 m., mostly rocky, and having many small ports. The surface is a succession of cultivated vales and hills. The hills rise in the west Lomond, 1713 ft., and Largo Law, 1020. The chief rivers are the Tay, Forth, Eden (20 m. long), and Leven (12). F. rests on old red sandstone, with trap rocks in the n., and carboniferous strata, with trap, in the south. There are many coal and iron mines, and lime quarries. The climate is dry, healthy, and mild on the Forth; but the valleys in the n. are much exposed to the full sweep of the e. and n.e. gales. The soil is a rich loam, or wet clay on till. The Howe of Fife, on the Eden, is mostly sandy and gravelly, and not very productive. In 1876, the total acreage under all kinds of crops, bare fallow, and grass, was 245,636; under corn crops, 87,533; under green crops, 47,509; clover, sandfoin, and grasses under rotation, 57,354. The total number of cattle reported the same year was 38,875; sheep, 69,159; pigs, 6,463; horses used for agriculture, etc., 10,222. F. has a greater number of proprietors, gentlemen's seats, and plantations, in proportion to its size, than any other Scotch county, and its coasts are thickly studded with towns and villages. The chief manufactures are linen, floor-cloth, and malt liquors. F. contains 61 parishes. Pop. '71, 160,735. It returns one member to parliament. The chief towns are Cupar (the county town). Dunfermline, St. Andrews, Kirkcaldy, East and West Anstruther, Burntisland, Crail, and Dysart. The ancient "kingdom of Fife" was the most cultivated, as well as the most warlike, of Scotch counties. It contains striking monastic, feudal, and palatial ruins at St. Andrews, Dunfermline, Falkland, and Lindores; many Celtic and Roman remains. Many of the events connected with the Scottish reformation took place in this county, especially at St. Andrews.

FIFTEENTH, a stop in English organs tuned two octaves above the diapasons, the lowest C pipe of which is two ft. long.

FIFTH MONARCHY MEN. Among the strange and whimsical forms of opinion which the religious and political fermentation of the 17th c. brought to the surface of society, and embodied in the shape of religious sects, were those of the Fifth Monarchy Men. The date which has been assigned to their first appearance is 1654. Notwithstanding the ridicule with which they have often been overwhelmed, their seems nothing in their tenets more objectionable than we find in those of many of the other sects of the period, and there is no reason to believe that the practices of their leaders exceeded in absurdity, or equaled in impiety, those of Robbins, Reeve, Muggleton, and other apostles of the Ranters. In common with most persons who hold the literal interpretation of prophecy, they believed in the four great monarchies of Antichrist marked out by the prophet Daniel; and quite consistently with Christian orthodoxy, they added to them a *fifth*—viz., the kingdom of Christ on earth. So far, there was nothing peculiar in their views. But their error was twofold. 1st. They believed in the immediate, or at least in the proximate, advent of Christ (a tenet which was common to them with the early church); and 2d. They held that the fulfillment of God's promise to this effect must be realized by the forcible destruction of the kingdom of Antichrist. Every obstacle which opposed itself to the setting up the Messiah's throne was to be thrown down, and what these obstacles were was a question for the solution of which the only criterion which presented itself was their own fanatical prejudices and hatreds. It is obvious that such doctrines in such times must have given rise to practical as well as speculative disorder. The Fifth Monarchy Men became extinct as a sect shortly after the restoration; a fact which, by depriving them of exponents of their own body, may have exposed them to misrepresentation (Marsden's *History of the Later Puritans*, p. 387). In politics, the Fifth Monarchy Men were republicans of the extremest section; and when their conspiracy to murder the Protector, and revolutionize the government, was discovered in 1657, their leaders, Venner, Grey, Hopkins, etc., were imprisoned in the Gate house till after the Protector's death. Amongst their arms and ammunition which was seized, was found a standard exhibiting a lion couchant, supposed to represent the lion of the tribe of Judah, with the motto, "Who will rouse him up?"—Neal's *Puritans*, vol. iv. p. 186. See also Carlyle's *Cromwell's Letters and Speeches*, vol. iii. p. 31.

FIG, *Ficus*, a genus of trees and shrubs belonging to the natural order *moraceæ*, and distinguished by having the flowers—male and female mixed—within an almost closed top-shaped fleshy receptacle, which enlarges to form the fruit, and incloses numerous one-seeded carpels, imbedded in its pulp. There are more than 100 species, some of them very large trees. Almost all belong to tropical and sub-tropical countries, of the vegetation of which they often form a most important feature. They abound in India, in every jungle and hilly situation, to the most northern Himalaya, and some of them are cultivated about every village. Both *F. religiosa* (the peepul) and *F. Rumphii* are held in veneration by the Hindus. The most notable species are the common F.; the banyan (q.v.); the peepul (q.v.), bo tree or sacred F. of India; the sycamore (q.v.); and the East Indian caoutchouc (q.v.) tree. The leaves of some species are entire, those of others are lobed. Several species of F. exhibit the character for which the banyan in particular has become celebrated, of sending roots straight down to the ground from their spreading branches, and thus multiplying the apparent stems, by which a vast canopy of branches and foliage is supported. The East Indian caoutchouc or india-rubber tree is remarkable for the exposure of its roots, which appear in masses above ground, extending on all sides from the base like great writhing snakes. Some figs are creeping or trailing shrubs, with slender stems, covering heaps of stones, or ascending trees like ivy.—Besides the common F., many species yield edible fruits, although none of them are nearly equal to it in value. Amongst them are the peepul (*F. religiosa*), *F. Benjamina*, *F. pumila*, *F. auriculata*, *F. Rumphii*, *F. Bengalensis*, *F. aspera*, *F. racemosa*, and *F. granatum*, all East Indian, also the sycamore of Egypt.—The milky juice of some species is bland and abundant, as of *F. Saussureana*, which has therefore been ranked among cow-trees. In other species, the milky juice is very acrid. That of the common F. produces a burning sensation on the tongue. That of *F. toxicaria*, a native of the Malayan islands, is used for poisoning arrows.—Lac (q.v.) is gathered from some species.—The leaves of *F. politoria* are so rough that they are used for polishing wood and ivory in India. The juice of the fruit of *F. tinctoria* is used in Tahiti to dye cloth; the color is at first green, but being acted on by the juice of a *cordia*, it becomes bright red. The bark supplies cordage, of which fishing-nets are made.

The COMMON F. (*ficus carica*) is a native of the east, as the specific name *carica* (from *caria*) imports; but it is now cultivated throughout the whole of the s. of Europe, and is even found naturalized there. Its cultivation has also extended to many warm countries. In North America, it is seldom to be seen further n. than Philadelphia; and it is not sufficiently hardy to be a common fruit tree in Britain, although even in Scotland figs may occasionally be seen ripened on a wall; and in the s. of England fig-trees are sometimes grown as standards, and a few small F. orchards exist. Protection is always given in some way during winter. Near Paris, and in

some other parts of the continent of Europe, fig-trees are so trained that the branches can be tied in bundles and laid along the ground, when they are covered with litter and earth. The F. is a low deciduous tree or shrub, with large deeply lobed leaves, which are rough above, and downy beneath. The branches are clothed with short hairs, and the bark is greenish. The fruit is produced singly in the axils of the leaves, is pear-shaped, and has a very short stalk; the color in some varieties is bluish-black; in others, red, purple, yellow, green, or white. The varieties in cultivation are numerous. In warm climates, the F. yields two crops in the year—one from the older wood (midsummer shoots of the preceding year), and a second from the young wood (spring shoots of the same year); but in colder regions the latter never comes to perfection. Fig-trees are propagated by seed, by suckers, etc.; very frequently by layers or by cuttings. In Britain, they are often to be seen in hothouses, and grow well in pots. Dried figs form an important article of food in the Levant; in more northern regions they are used for dessert, or for medicinal purposes, being applied to gumboils and other sores, and also administered in pulmonary and nephritic affections, and to relieve habitual constipation. The pulp contains about 62 per cent of a kind of sugar called *sugar of figs*. Figs are either dried in the sun or in ovens built for the purpose. Great quantities are annually imported into Britain from the Mediterranean. The best are mostly brought from Smyrna, and are known as *Turkey figs*, of which those called *Eleme* or *Elemi* are most highly esteemed. Figs of inferior quality are imported in considerable quantities in the form of *fig-cake*, pressed along with almonds into cakes somewhat like small cheeses. In the Levant, Portugal, and the Canaries, a spirit is distilled from fermented figs.

FIG'ARO, a dramatic character introduced on the Parisian stage in 1785 by Beaumarchais (q.v.) in his *Barbier de Seville* and his *Mariage de Figaro*. These plays, in which F., who coolly outwits every one, is first a barber and then a valet-de-chambre, secured for their author a brilliant reputation not only in France, but also in Germany, where many translations and adaptations of the pieces appeared. Mozart, Paesiello and Rossini also made them the basis of classic operas. Since their publication, the character of F. has stood as a type of cunning, intrigue, and dexterity. After the restoration of the Bourbons, a literary periodical, distinguished for its satirical talent, assumed the name.

FIGEAC, a t. of France, in the department of Lot, is situated in a valley surrounded by finely wooded hills on the right bank of the Sellé, 32 m. e.n.e. of Cahors. It is irregular, its streets are narrow, and badly planned, and its houses in general not well built, but the antiquity and quaintness of many of its buildings give it a picturesque and interesting appearance. It has two beautiful Gothic churches, one of them, that of St. Sauveur, has a choir of the 11th, a general superstructure of the 15th, and a modern front of the 19th century. F. owes its origin to a Benedictine monastery, founded by Pepin in 755 A.D. It has some cotton manufactures, and a trade in wine and cattle. Pop. '76; 5,660.

FIGHTING FISH, *Macropodus pugnax* or *Ctenops pugnax*, a small fresh-water fish, of the family *anabasidæ* (q.v.), a native of the s.e. of Asia, and particularly of Siam, where it is very commonly kept as gold-fishes are in Britain, but on account of its pugnacity. Two of these creatures when brought together, often rush immediately to combat, or it is even enough to introduce a looking-glass into the water, and the fish hastens to attack its own image. Fish-fights are a favorite amusement of the Siamese; the license to exhibit them yields a considerable annual revenue; and an extraordinary amount of gambling takes place in connection with them; not merely money and property, but children and liberty being sometimes staked. The F. F. has the anal and dorsal fins prolonged into tapering points. When the fish is quiet, its colors are dull; but when it is excited, they glow with metallic splendor, and "the projected gill-membrane, waving like a black frill around the throat, adds something of grotesqueness to the general appearance."

FIGLINÉ, or FIGHINE, a t. of central Italy, in the province of Florence, and 15 m. s.e. from Florence, on the left bank of the Arno. It is surrounded by a rectangular wall, and is traversed by a fine street, through which passes the great road from Florence up the valley of the Arno. The silk of F. is the best in Tuscany. Pop. '72, 5,673.

FIGUEIRA, a t. of Portugal, in the province of Beira, at the mouth of the Mondego, 23 m. w. by s. from Coimbra. Its harbor is a small bay or estuary of the Mondego, and is safe, but difficult of access, particularly for large vessels. It carries on, however, a considerable trade. The chief exports are salt, wine, vinegar, oil, dried fruits, and oranges. The wine shipped from F. is known in England by the names of *Figueira* and *Bairrada wine*. It is quite different both from port and from sherry. It is best when new, and does not bear keeping long. F. is much resorted to as a bathing-place. Pop. 6,000

FIGUERAS, a t. in the n.e. of Spain, is situated near the French frontier, in the province of Gerona in a fruitful district, 20 m. n.n.e. of the town of Gerona. Its streets are gloomy, but it has beautiful promenades. On a height near the town is the citadel of S. Fernando, the strongest fortress of Spain, and the key of the Pyrenees on their s. side, with accommodation for 20,000 men. This fortress has been so frequently taken

by the French, as to give rise to the remark, common enough among the Spaniards, that the citadel of S. Fernando, in time of peace, belongs to Spain, but in time of war to France. Pop. 7,400.

FIGUERAS, ESTANISLAO, b. 1819; a Spanish statesman on the ultra liberal side at first, but afterwards a supporter of Espartero. He was a member of the Cortes (national legislature) in 1851; and was re-elected in 1862. In 1866, he was complicated in the revolutionary movements, and was imprisoned by Narvaez. After the abdication of Isabella he was a judge and a member of the revolutionary committee. Again sent to the national legislature he became a prominent leader of the republican party, and after the abdication of king Amadeo in 1873, provisional president of the republic.

FIGUERO'A, FRANCISCO DE, 1540-1620; a Spanish poet, called "the divine;" educated in the university, and served in the army. He wrote the first good Spanish blank verse.

FIGUIER, GUILLAUME LOUIS, b. 1819; a French chemist and scientific writer. He commenced the study of chemistry under his uncle, was made doctor of medicine in 1841, and in the following year went to Paris to continue his studies. In 1846, he was appointed professor of the school of pharmacy in Montpellier. Afterwards, however, he returned to Paris, and in 1855, became scientific editor of *La Presse*. His contributions to scientific journals are numerous. Among the most important are: *Exposition et Histoire des principales Decouvertes Scientifiques Modernes; Histoire des Merveilleux dans les Temps Modernes;* and *Vies des Savants Illustres depuis l'Antiquite jusqu' au XIX Siecle. The Human Race; The Insect World; The World before the Deluge*, and several other popular works of this author have been translated into English.

FIGULINE. See POTTER'S CLAY.

FIGURANTES is the term applied in the ballet to those dancers that do not come forward alone, but dance in troops, and also serve to fill up the scene and form a background for the solo dancers.

FIG'URATE NUMBERS. The nature of F. N. will be understood from the following table:

	1,	2,	3,	4,	5,	6,	7, etc.
I.	1,	3,	6,	10,	15,	21,	28, etc.
II.	1,	4,	10,	20,	35,	56,	84, etc.
III.	1,	5,	15,	35,	70,	126,	210, etc.
		etc.				etc.	

The natural numbers are here taken as the basis, and the first order of F. N. is formed from the series by successive additions; thus, the 5th number of the first order is the sum of the first five natural numbers. The second order is then formed from the first in the same way; and so on.

If instead of the series of natural numbers, whose difference is 1, we take series whose differences are 2, 3, 4, etc., we may form as many different sets of figurate numbers. Thus:

	1,	3,	5,	7,	9, etc.
I.	1,	4,	9,	16,	25, etc.
II.	1,	5,	14,	30,	55, etc.
III.	1,	6,	20,	50,	105, etc.
		etc.			etc.

Or—

	1,	4,	7,	10,	13, etc.
I.	1,	5,	12,	22,	35, etc.
II.	1,	6,	18,	40,	75, etc.
III.	1,	7,	25,	65,	140, etc.
		etc.			etc.

The name *figurate* is derived from the circumstance, that the simpler of them may be represented by arrangements of equally distant points, forming geometrical figures. The numbers belonging to the first order receives the general name of *polygonal*, and the special names of *triangular*, *square*, *pentagonal*, etc., according as the difference of the basis is 1, 2, 3, etc. Those of the second order are called *pyramidal* numbers, and according to the difference of the basis, are triagonally, quadragonally, or pentagonally pyramidal. The polygonal numbers may be represented by points on a surface; the pyramidal by piles of balls.

The general formula for polygonal numbers, from which any particular one may be found by substituting the proper values for n and r is,

$$\frac{(r-2)\,n^2 - (r-4)\,n}{2}$$

where n= number of the term required, r = the denomination (3 if triagonal, 5 if pentagonal, etc.).

FIGURE, GRAMMATICAL. See METONYMY, and SYNECDOCHE, *ante*.

FIGURE, RHETORICAL, an ideal characterization, or illustration, which may be affirmed by one mind and denied by another, or affirmed and denied by the same mind under different conditions. It is usually an exaltation or a depreciation of a person or thing; as "Shakespeare was divine" in appreciation; or, "Tompkins is a goose," in depreciation. In any case its expression is in metaphor. See METAPHOR.

FIGURED BASS, in music, is a bass part with figures placed over the notes, which indicate the harmony to be played to each note, and serves as a guide to the accompanist. Ludovico Viadana is said to have been the inventor of F. B. in the 17th century.

FIGURE-STONE. See SOAP-STONE.

FIGWORT, of the order *scrophulariacea;* a flowering plant indigenous to North America and Europe; once thought valuable as a remedy for scrofula.

FIJI, FEEJEE, or VITI **ISLANDS,** an archipelago of about 312 islands in the southern Pacific ocean, situated in lat. 15° 30′ to 20° 30′ s., and long. 177° to 178° west. The group, which has a total area of 8,034 sq.m., almost equal to that of Wales, was discovered in 1646 by the Dutch navigator Tasman. The largest of the group, Viti-levu, or Big Viti, has an area of 4,479 sq.m.; Vanua-levu, of 2,486 sq.m.; and all the other islands together, of 1069 sq. miles. The islands are of volcanic origin, and although there are no longer any active volcanoes, yet hot springs, numerous earthquakes, and other signs testify that the subterranean forces are not quite extinct. They are all coral-girt; and to the approaching navigator appear clothed to their very summits with a dense and luxuriant vegetation. The surface is generally hilly, and the soil, owing to the abundant rain, is very productive. The windward sides of the islands are covered with thick forests, while to the leeward we see a grassy country dotted here and there with screw-pines. The most important river is the Kailevu, in the island of Vanua-levu, navigable for 60 m. from its mouth; the others are comparatively insignificant. The climate is extremely fine, and the country is said to be exceedingly healthy. The mean annual temperature is about 80° F., and the heat is tempered by the trade and other winds. Hurricanes, though rarely, do sometimes occur. In 1866, two severe storms burst over the entire group, doing great damage to the plantations.

The natural productions of Fiji or Viti are of the most varied description, and the vegetation is, on the whole, of a tropical nature. The mountain districts are well adapted to the growth of coffee; and though the coffee plantations were destroyed by the cyclone of 1866, the injury has been repaired, and the produce is again very considerable. Of late years, the European settlers have seriously begun the cultivation of the sugar-cane, which grows wild on the islands; and tobacco is raised in sufficient quantities for the consumption of the inhabitants, who are great smokers. There are many plants yielding oil and fat, of which the most important is the cocoa-nut palm. From 400 to 700 tons of the oil obtained from it are annually contributed to the missionaries by the natives. Of cotton, which was introduced into the islands some time ago, 650 cwt. were exported in 1864; 5,880 cwt. in 1866; and in 1873 about 14,000 cwt.; but in the last year the quality was considerably inferior. The staple article of food is the yam, by the ripening season of which the natives regulate their calendar, and which frequently attains the length of 8 ft., with a weight of 100 pounds. In other articles of vegetable diet, and especially in edible fruits, Viti is remarkably rich. Among the latter may be instanced bananas, plantains, the bread-fruit, oranges, shaddocks, the guayava, and pine-apples. Timber of excellent quality abounds, suitable both for house and ship-building. There are few animals in Viti; the live-stock of the natives consisting of the pig, the dog, and fowls. Sheep have been lately introduced, and promise to thrive fairly. Fish are numerous, both in the sea and rivers, and the trepang, or beche-de-mer fisheries, are carried on with vigor along the northern coast of Vanua-levu. Of the mineral resources of Viti we know little; copper and antimony are, however, said to exist.

The export trade of the islands has not been commensurate with their vast natural wealth. The value of exports in 1864 amounted to £19,800; in 1867, to £39,960; and in 1877, to £140,893; the imports for 1877 were £134,688 Cotton, cocoa-nut oil, tortoise-shell, and wool are the chief exports; while the imports embrace Manchester goods, iron-mongery, cutlery, wine, beer, spirits, groceries, etc. There are excellent harbors, among which that of Levuka, the chief town, situated on Ovalau, lately provided with a light-house, is the most important.

The native inhabitants are for the most part Melanesians, with dark complexions and long woolly hair. They are strong-limbed, muscular men; but are generally reported to be averse to continued labor. At all events the planters have had to look abroad for assistance in their fields. A considerable intermixture has taken place with the Polynesian Tonga islanders, and one of their chiefs has gained possession of the Windward islands (his residence being on Lakembor), and holds the title of viceroy of Viti. Up till 1854 cannibalism was universal in the islands; but since that date it has been suppressed, or at least banished to the most remote districts, through the efforts of the missionaries. About one third of the natives are professed Christians, and almost all have abandoned their idols. The Wesleyans, who first came in 1835, have made most converts; but the Roman Catholic priests, arriving in 1846, have also been successful. Many of the missionary schools are taught by natives, the great majority of whom can read and write their

own language. There are four newspapers published, one of which is a native production.

The native pop. was lately estimated at 146,000, of whom 70,000 were in Viti-levu, 33,000 in Vanua-levu, and 43,000 in the smaller islands; but a deadly epidemic of measles in 1875, introduced by a British man-of-war, reduced that number by at least one third. The white pop. was estimated in 1876 at 1569 persons, of various nationalities, but most of them British subjects from other colonies.

The later history of Viti has been very tumultuous, and to this fact is undoubtedly owing the small extent of its commerce. In 1855, Thakaumba, chief of Bau, was made responsible for a debt due from the natives to the Americans, and this resulted in his election to the dignity of "Tui Viti," or king of Viti. In 1857, he offered to cede Viti to Great Britain, in consideration of the payment of his debt to America, stipulating only for the retention of his title and authority over the natives. This offer, however, was refused by the British government in 1862, after sending out a deputation. A "Polynesian company" was then started, which undertook to clear off the debt, in return for certain valuable privileges, but ultimately it collapsed. In 1869 the president of the United States refused the protectorate of the islands. From that date until 1873, the government sanctioned three or four unsuccessful constitutions. The cession of the islands to Britain was renewed in 1873, and accepted, and on Sept. 30, 1874, they were annexed as a crown colony. Under sir Arthur Gordon's governorship, they have made great material and political progress.

FILADEL'FIA, a t. of s. Italy, in the province of Catanzaro, 18 m. w.s.w. from Catanzaro, on the western side of the Apennines, and on a branch of the Angistola. Pop. 5,700.

FILANGIE'RI, CARLO, 1783–1867; son of Gaëtano; an officer in the French, and afterwards in the Neapolitan, army; an impetuous, rash spirit. He was concerned in many duels, in one of which he killed gen. Franceschi. Murat made him a general. He was always a supporter of absolute power, and in 1848 aided the opposition to the revolutionary movement by taking Messina after a fierce bombardment. He reduced Sicily to submission, and was made governor-general with dictatorial powers.

FILANGIE'RI, GAËTANO, 1752–88; an Italian writer on public polity. His *Scienza della Legislazione* appeared in 1780, and had great success. But this and earlier writings fell under the censure of the papal church, and were condemned by the congregation of the Index. His works have had much influence on European thought.

FILA'RIA. See GUINEA-WORM and THREAD-WORM.

FILBERT. See HAZEL.

FILE (Fr. *file*, a row, Lat. *filum*, Ital. *fila*, *filo*), in a military sense, is used to signify any line of men standing directly behind each other, as *rank* refers to men standing beside one another. In ordinary formations of the present day, a battalion stands two deep, or in two ranks—front and rear—wherefore a file consists of two men. Sometimes, however, the battalion may be formed much more solidly, as in a square, when the file comprises a far larger number. The number of files in a company describes its width, as the number of ranks does its depth. thus, 100 men in "fours deep" would be spoken of as 25 files in 4 ranks.

FILE—FILING. A file is a steel tool, having its surface covered with teeth or serratures, and used for cutting down and shaping metals and other hard substances. There is little doubt that in the earlier stages of metal-working, when bronze implements first superseded those of stone, rough stones were used for the purposes to which files are now applied; nevertheless, the use of files dates from high antiquity. They are mentioned in the Old Testament in the first book of Samuel, xiii. 21, also in the *Odyssey*.

Files are made of almost every conceivable shape, to suit the very varied purposes to which they are applied—flat, square, round or *rat-tail*, triangular, half-round, feather-edged, etc., besides being variously bent, in order to get at intricate work. Nearly all these files are made thicker in the middle, or "bellied," the object of which will be explained under FILING.

Files require to be made of the very best steel, which is first forged into the required shape, and is then called a "blank." The blanks are then finished more accurately to the required form by grinding, planing, or filing.

The blanks thus prepared and well softened (see TEMPERING) are next handed to the cutter, who sits astride on a low bench or stool, and has before him a stone anvil, with a flat piece of pewter laid upon it. The blank is held upon the anvil, with its tang towards the cutter, by means of a long loop of leather-strap, into which the cutter places his foot. He then cuts the teeth by striking with a hammer a short stout chisel, held obliquely at an angle of about 12° or 14° from the perpendicular. The object of this will be easily understood; for, if the chisel were perpendicular, a furrow like the letter V would be indented, and an equal burr struck up on each side; but, instead of this, a cutting tooth like that of a saw, but with less obliquity, is required; this is effected by the obliquity of the chisel, and a burr is thrown up on one side only—viz., towards the tang.

The astonishing regularity observable in the distance between the teeth is secured in

this way: The cutting is commenced at the point of the file; the chisel is then drawn backwards, laid upon the blank, and slid forwards till it reaches the burr raised by the last cut; the blow is now struck, and another tooth and burr produced, which serves as a guide for the next cut; and so on. The distance between the teeth thus depends on the force of the blow, and the obliquity of the cut; for the heavier the blow, the greater the ridge or burr, and the obliquity determines the distance of the cut from the burr; the skill of the workman consists, therefore, in the precise regulation of the blows.

Most files are double cut—that is, they have two series of *courses* of chisel-cuts, which are oppositely inclined at an angle of about 55° to the central line of the file. The second course is made in the same manner as the first, but with lighter blows, and is usually somewhat finer than the first. This angular crossing converts the ridges into pointed teeth. Files used for soft metals which are liable to clog the teeth, are single cut—that is, they have but one course of cuts. Taper files have the teeth finer towards the point. Rasps for wood are cut with pointed chisels; each tooth being an angular pit with a strong burr, instead of a long furrow. The newly cut teeth in the soft steel are preserved from injury by being laid upon the softer pewter block before referred to. The rapidity with which the blows are struck varies with the fineness of the file; 60 or 80 cuts are commonly made per minute.

Files have to be very carefully hardened and tempered. If heated too strongly, or made too hard, the steel is so brittle that the teeth tear off; if too soft, they wear down rapidly, and the file soon becomes useless. Great care is also required in keeping them straight, as the sudden cooling necessary for hardening is very apt to warp the steel.

At first sight, it would appear, from the simplicity and continual repetition of the movements required in file-cutting, and the precision and regularity of the work, that it is an operation specially adapted for machinery. Many attempts have been made to cut files by machinery, but with only partial success; the chief difficulty arises from the necessity of modifying the force of the blow to suit the hardness of the steel. It is practically impossible to supply a large number of blanks all of exactly the same hardness; and if the machine be adjusted to suit the hardness of one blank, it may strike too heavy or too light a blow for the next; whereas the workman *feels* at once the hardness of the steel he is working upon, and adjusts his blows accordingly.

Filing.—To the uninitiated, this may seem a simple operation of rubbing one piece of metal upon another, and requiring only muscular strength and no skill. This is far from being the case, for a skillful workman will, in a given time, with a given amount of muscular work, cut away a far greater quantity of metal with a file than one who is unskillful, for he makes every tooth *cut into* the work, instead of *rubbing over* it. To do this, he must adapt the pressure and velocity of motion of the file to the coarseness of its teeth, and the hardness, brittleness, and toughness of the material he is working upon.

To *file flat*, that is, to avoid rounding the sharp edges of a narrow piece of work, is very difficult, and some years of continual practice is required before an apprentice can do this well, especially in "smoothing up" or finishing work before polishing, and there are some who never succeed in filing, smoothing, and polishing without rounding the edges of fine work. The power of doing this constitutes the main test of skill among mathematical instrument makers and other metal-workers. The flattest surface can be obtained by laying the work, where its form admits, upon a piece of cork held in the vise, and filing it with *one hand*, the pressure on the file being communicated by the forefinger.

It is mainly to aid the workman in filing flat that the rounded or bellied form is given to files; this partially compensates the tendency of the hands to move in a curved line with its convexity upwards when they move forward and apply pressure, as in the act of filing.

FILE FISH. See Balistes, *ante*.

FILIATION, the correlative of paternity. In the law of Scotland, the F. of a child is the process by which its paternity is determined. The general rule that the father is he whom the marriage points out (*pater est quem nuptiæ demonstrant*), is a presumption which may be overcome by showing its impossibility in point of fact—as, for example, where the husband is impotent, or where he has been absent from his wife during the period between the eleventh solar and the sixth lunar month preceding the birth. As regards natural children, a *copula* more than ten months before birth does not filiate, but it forms an important adminicle of proof, which, till the passing of 16 Vict. c. 20, it was held might be completed by the oath of the mother. As to the effect of that statute on the previously existing law, see Evidence, and Semiplena Probatio.

FILIBUSTERS, another name for the piratical adventurers whose origin and history are treated of under *Buccaneers* (q.v.). Recently it has become familiar to English ears as the designation of certain lawless adventurers belonging to the United States, who have attempted violently to possess themselves of various countries in North America. The plea urged by these persons has generally been, that such countries were a prey to anarchy and oppression, and could only attain to prosperity by annexation to the United States, and the introduction of "democratic" institu-

tions—among which, strange to say, slavery stands prominent. The most notorious of these filibusters was the late William Walker, whose expedition against Nicaragua in 1855 was so far successful that he kept his ground in that country for nearly two years. At last, he was driven out by a combination of the various states of Central America. He was subsequently captured and shot, Sept. 12, 1860, at Truxillo, in Central America, in the course of another piratical expedition.

FILICA'JA, VINCENZO, a lyrical poet of Italy, was b. at Florence, of an ancient but impoverished family, in 1642. Deeply wounded, while yet a youth, in his affections, he resolved to dedicate his undivided genius to heroic, martial, and sacred themes, for swearing all amatory compositions for the future, and perversely consigning his exquisite love inspirations to the flames. In six sublime odes, F. celebrated the deliverance of Vienna in 1683 from the besieging forces of the Turks, chiefly effected by the heroism of John Sobieski, king of Poland, and of Charles duke of Lorraine. On the publication of the odes in Florence in 1684, F. became, almost in spite of himself, famous, and attracted the notice of queen Christina of Sweden, an ardent admirer and munificent protectress of Italian letters and genius. Relieved from harassing pecuniary embarrassments by the liberal patronage of Christina, F. was enabled, with undisturbed powers, to devote himself to composition, some of his most touching verses being addressed to his royal benefactress. Patriotic sonnets, the grandest of which is a lament over the internal weakness of Italy—*Italia, Italia, O tu cui feo la sorte*—and heroic odes, severely classic in form, are the chief works of Filicaja. His career as patriot, citizen, and man, won him reverence and love as universal as was the admiration accorded to his works. In advanced age, he was appointed judge and senator, and in 1702 was called to one of the highest magisterial offices in Florence, where he died in honored peace, Sept. 24, 1707. His works, under the title of *Poesie Toscane di Vincenzo da Filicaja, Senatore Fiorentino e Accademico della Crusca,* were published after his death. The best edition is that of Venice (2 vols. 1762), containing both the Italian and Latin verses of the author.

FI'LICES. See FERNS.

FILIGREE, from the Italian *filigrana* (*filo,* a thread or wire, and *grano,* a grain or bead), the old filigree-work being ornamented with small beads. The name is now applied to delicate wire-work ornaments, usually made of gold of silver wire, which is twisted into spirals and other convoluted forms; and these spirals, etc., are combined to form a sort of metallic lace-work, which is shaped into brooches, ear-rings, crosses, head ornaments, and others of a very light and elegant character. This work is chiefly done in Malta, India, Genoa, the Ionian islands, and some parts of Turkey. It sometimes receives the general name of *Maltese work.*

FILIGREE (*ante*). This art may be said to consist in curling, twisting, and plaiting fine pliable threads of metal, and uniting them at their points of contact with gold or silver solder and borax, by the help of the blow-pipe. Small grains or beads of the same metals are often set in the eyes of volutes on the junctions, or at intervals at which they will effectively set off the wire-work. The more delicate tracery is generally protected by framework of stouter wire. Brooches, crosses, ear-rings, and other personal ornaments of modern filigree are usually surrounded and subdivided by bands of square or flat metal, giving consistency to the filling up, which would not otherwise keep its proper shape. Probably the oldest existing jewel work is that which has been found by Belzoni, Wilkinson, Mariette, and other Egyptian discoverers in the tombs of Thebes and similar places, in which filigree forms an important feature of the ornamentation. Amongst the jewelry now in the British museum, and in the Louvre in Paris, are examples of the round plaited gold chains of fine wire, such as are still made by the filigree workers of India, and known as Trichinopoly chains. From some of these are hung smaller chains of finer wire, with minute fishes and other pendants fastened to them. Most of the rings found in these collections are whipped with gold wire soldered to the hoop. The Greek and Etruscan filigree of about 3,000 years ago is of extraordinary fineness and perfect execution. A number of ear-rings and other personal ornaments found in central Italy are preserved in the Campana collection of the Louvre and amongst the gems of the British museum. Almost all of them are made of filigree. Some ear-rings are in the form of flowers of geometric design, bordered by one or more rims, each made up of minute volutes of gold wire, and this kind of ornament is varied by slight differences in the way of disposing the number or arrangement of the volutes. But the feathers and petals of modern Italian filigree are not seen in these ancient designs. In many ear-rings, chains hang from the upper part, and tiny birds, such as doves or peacocks, covered with enamel, are set amongst these hanging ornaments. Other Etruscan ear-rings are short tubes of gold, half or three quarters of an inch long by half an inch or less in diameter, with a plate of gold attached to the side, and the whole surface covered with filigree soldered on in minute patterns. Many rings resemble fishes with the tails in their mouths, made up of thin plates of gold and wire work of the same metal. A beautiful collection of antique examples of Greek jewelry found in the Chersonese and along the coast of Asia Minor was placed, before the Crimean war, in a museum at Kertch. Many bracelets and necklaces in that collection are made of twisted wire, some in as many as seven rows of plaiting, with clasps in the shape of

heads of animals of beaten work. Others are strings of large beads of gold, with grains of gold, or with volutes and knots of wire soldered over the surface. In the British museum a scepter, probably that of a Greek priestess, is covered with plaited and netted gold wire, finished with a sort of Corinthian capital and a boss of green glass. It is probable that in India and various parts of central Asia filigree has been worked from the most remote period without any change in the designs. Whether the Asiatic jewelers were influenced by the Greeks settled on that continent, or merely trained under traditions held in common with them, it is certain that the Indian filigree workers retain the same patterns as those of the ancient Greeks, and work them in the same way, down to the present day. Wandering workmen are given so much gold, coined or rough, which is weighed, heated in a pan of charcoal, beaten into wire, and then worked in the courtyard or veranda of the employer's house, according to the designs of the artist, who weighs the complete work on restoring it, and is paid at a specified rate for his labor. Very fine grains or beads and spines of gold, scarcely thicker than a coarse hair, projecting from plates of gold are methods of ornamentation still used. This work requires the utmost delicacy of hand, and is of extraordinary richness of effect. Signor Castellani, the modern Cellini of Italy, who has made the unique filigree of the Etruscans and Greeks his special study, found it for a long time impossible to revive this particular process of delicate soldering; but the difficulty has been overcome at last. Passing to later times, we may notice in many collections of mediæval jewel work, reliquaries, covers for the gospels, etc., made either in Constantinople from the 6th to the 12th c., or in monasteries in Europe, in which Byzantine goldsmiths' work was studied and imitated. These objects, besides being enriched with precious stones, polished but not cut into facets, and with enamel, are often decorated with filigree. Large surfaces of gold are sometimes covered with scrolls of filigree soldered on; and corner pieces of the border of book covers, or the panels of reliquaries, are not unfrequently made up of complicated pieces of plaited work alternating with spaces incrusted with enamel. Byzantine filigree work occasionally has small stones set amongst the curves or knots. In the n. of Europe, the Saxons, Britons, and Celts were from an early period skillful in several kinds of goldsmiths' work. As early as the middle of the 5th c., the brooches and other personal ornaments of the "Littus Saxonicum" in England were encrusted with enamel work varied with borders or centers of filigree. The Irish filigree work is more thoughtful in design and more varied in pattern than that of any period or country that could be named. It reached its highest perfection, according to Dr. Petrie, in the 10th and 11th centuries. The royal Irish academy in Dublin contains a number of reliquaries and personal jewels, of which filigree is the general and most remarkable ornament. The "Tara" brooch has been copied and imitated, and the shape and decoration of it are well known. Instead of fine curls or volutes of gold thread, the Irish filigree is varied by numerous designs, in which one thread can be traced through curious knots and complications, which, disposed over large surfaces, balance one another, but always with special varieties and arrangements difficult to trace with the eye. The long threads appear and disappear without breach of continuity, the two ends generally worked into the head and tail of a serpent or a monster. The reliquary containing the "bell of St. Patrick" is covered with knotted work in many varieties. A two-handled chalice, called the "Ardagh cup," found near Limerick a few years since, has belts, bosses at the junctions of the handles, and the whole lining of the foot ornamented with work of this kind of extraordinary fineness. The late lord Dunraven numbers forty varieties of pattern of this cup alone. Much of the mediæval jewel work all over Europe down to the 15th c., on reliquaries, crosses, crosiers, and other ecclesiastical goldsmiths' work, is set off with bosses and borders of filigree. Filigree in silver was practiced by the Moors of Spain during the middle ages with great skill, and was introduced by them and established all over the peninsula, where silver filigree jewelry of delicate and artistic design is still made in considerable quantities. The manufacture spread over the Balearic islands, and among the populations that border the Mediterranean, and continues all over Italy, and in Albania, the Ionian islands, and many other parts of Greece. That of the Greeks is sometimes on a large scale, with several thicknesses of wire alternating with larger and smaller bosses and beads, sometimes set with turquoises, etc., and mounted on convex plates, making rich ornamental head-pieces, belts, and breast ornaments. Filigree silver buttons of wire-work and small bosses are worn by the peasants in most of the countries that produce this kind of jewelry. Silver filigree brooches and buttons are made also in Denmark, Norway, and Sweden. Little chains and pendants are added to much of this northern work. Beautiful specimens have been contributed to the various international exhibitions. Some very curious filigree was brought from Abyssinia after the capture of Magdala—arm guards, slippers, cups, etc. They are made of thin plates of silver, over which the wire-work is soldered. Filigree is subdivided by narrow borders of simple pattern, and the intervening spaces are made up of many patterns, some with grains set at intervals. Great interest has been felt in the revival of the designs of antique jewelry by Signor Castellani. He collected examples of the peasant jewelry still made in many provinces of Italy on extraordinary designs preserved from a remote antiquity. Most of the decoration is in filigree of many varieties. It was in part through the help of workmen in remote villages, who retained the use of various kinds of solders, long forgotten else-

where, that the fine reproductions of antique gold filigree have been so beautifully executed in Italy, and by Italian jewelers.—[From *Ency. Brit.*, 9th ed.]

FILIOQUE, a Latin term signifying "and from the Son," designates a controversy between the Greek and Latin churches which has been prolonged through many centuries. The council of Nicæa, 325 A.D., while it affirmed that the Son is of the same substance with the Father, simply added that it believed in the Holy Spirit. The council of Constantinople, 381 A.D., declared that the Spirit is of the same substance with the Father and the Son, and that he proceedeth from the Father. This is in accordance with the teaching of Christ to his apostles, and, while it does not affirm that he proceedeth from the Father *only*, certainly seems to imply it. In the Latin church the idea of the double procession seems always to have prevailed. Augustin taught clearly that the spirit proceedeth from both the Father and the Son. At the third synod of Toledo, 589 A.D., which, however, had not ecumenical authority, "filioque" was added to the creed. In the eastern church the addition was not accepted. In 809 pope Leo III. refused to sanction the addition to the creed, but approved the doctrine as scriptural and sound. In the 9th c., when the controversy arose between the patriarch of Constantinople and the pope which caused the schism between the churches, the doctrinal difference was discussed, and the western church was reproached for having departed from the faith. At length Rome did add the clause to the creed, but not publicly; no decretal or other document announced it to the church. In 1014, when Henry II. was crowned at Rome, the creed with the added clause was chanted at high mass. In 1274, at the council of Lyons, a vain attempt to reconcile the two portions of the church was made. In 1439, at the council of Florence, the effort was renewed, at first with apparent success; but the Greek church would not accept the compromise that had been agreed on. Later efforts have been equally unsuccessful. Yet the two churches both maintain the doctrine of the Trinity, while they differ only in the vain endeavor to understand and explain it. And even in this there is substantial agreement between them, for the Greek church admits the doctrine of a double procession in a sense which is in accordance with Scripture and is, probably, not essentially different from that which the Latin church maintains. In 1718, the Greek patriarch and synod made the following declaration: "We thus believe that there is a twofold procession of the Holy Spirit, the one natural, eternal, and before time, according to which the Holy Spirit proceeds from the Father alone; the other, temporal and deputative, according to which the Holy Spirit is externally sent forth, derived, proceeds, and flows from both the Father and the Son for the sanctification of the creature." Both these processions are contained in the words of Christ: "The Comforter, *whom I will send unto you from the Father;* even the Spirit of truth *who proceedeth from the Father.*" At a conference of Old Catholic, Anglican, and eastern theologians, held at Bonn in 1874, there was a general agreement that the words *filioque* had been added to the creed in an illegal manner; and that peace and unity would be greatly promoted if the entire church could find a way to restore the creed to its original form, without sacrificing the doctrine held by the western churches. Thus far there has been no announcement of any progress towards the accomplishment of the desired unity.

FI'LIPO-D'ARGIRO, SAN, a t. of Sicily, in the province of Catania, and about 30 m. w.n.w. of the town of that name, stands on the right bank of the Traina, in an exceedingly fertile district. It contains a ruined Saracenic castle, and several religious edifices. Saffron of good quality, and in considerable quantity, is grown in the vicinity. Pop. '72, 11,876. San Filipo-D'Argiro stands on the site of the ancient Sikelian city of Agyrium, the birthplace of Diodorus Siculus, and which, about 400 B.C., is said to have had 20,000 citizens.

FILLAN, SAINT. Two Scoto-Irish saints of the name of Fillan appear in the church calendars, and have left their mark on the topography of Scotland and Ireland. (1.) ST. FILLAN, or Faolan, surnamed the leper, had his yearly festival on the 20th of June. His chief church in Scotland was at the e. end of loch Erne, in Perthshire, where "St. Fillan's well" was long believed to have supernatural powers of healing. A seat in the rock of Dunfillan still keeps the name of "St. Fillan's chair;" and two cavities beside it are said to have been hollowed by St. F.'s knees in prayer. His Irish church is at Ballyheyland (anciently called Killhelan or Kill Faelain), in the barony of Cullenagh, in Queen's county. (2.) ST. FILLAN, the abbot, the son of St. Kentigerna of Inchcaileach, in loch Lomond, lived in the 8th c., and had his yearly festival on the 7th or 9th of Jan. He joined the monastery of St. Mund on the Holy loch, and after that saint's death, succeeded him as abbot. His chief church in Scotland was in Perthshire, in the upper part of Glendochart, which takes from him the name of Strathfillan. Here, a well-endowed priory, dedicated in his honor, was repaired, or rebuilt, in the beginning of the 14th century. King Robert Bruce made a grant of money to the work, in gratitude, probably, for the miraculous encouragement which he was said to have received on the eve of Bannockburn from a relic of the saint—one of his armbones inclosed in a silver case. Another relic of St. F.—the silver head of his crosier, or pastoral staff—has been preserved to our time. It is called the "coygerach," or "quigrich," and appears in record as early as the year 1428, when it was in the

hereditary keeping of a family named Jore or Dewar, who were believed to have been its keepers from the time of king Robert Bruce. They had half a boll of meal yearly from every parishioner of Glendochart who held a merk land, and smaller quantities from smaller tenants; and they were bound, in return, to follow the stolen cattle of the parishioners wherever their traces could be found within the realm of Scotland. The quigrich, besides its virtues in the detection of theft, was venerated also for its miraculous powers of healing. In 1487, the right of keeping it was confirmed to Malice Doire, or Dewar, by king James III., in a charter, which was presented for registration among the public records of Scotland so lately as the year 1734. Sixty years later, the quigrich still commanded reverence; but its healing virtues were now only tried on cattle, and its once opulent keepers had fallen to the rank of farm-laborers. It was publicly exhibited in Edinburgh, in the year 1818, before being carried to Canada, by its hereditary keeper, Archibald Dewar. His son, Alexander Dewar, desirous that it should be restored to Scotland, came to an arrangement whereby, partly by purchase and partly by gift, it became the property of the society of antiquaries of Scotland. It was described by Dr. Daniel Wilson in a paper in the *Canadian Journal*, No. xxiv., reprinted as *The Quigrich, or Crosier of St. Fillan* (Toronto, 1859); see also *Historical Notices of St. Fillan's Crosier* by Dr. Stuart, reprinted from the *Proceedings of the Society of Antiquaries of Scotland*, vol. xii. (1877). A linn in the river Fillan, or Dochart, in Strathfillan, was long believed to work wonderful cures on insane persons, who were immersed in the stream at sunset, and left bound hand and foot till sunrise in the ruins of the neighboring church of St. Fillan. A hand-bell, which bore the name of St. Fillan, was also believed to work miracles.

FILLET, in architecture, a small space or band like a narrow ribbon used along with moldings.

FILLET, in heraldry, is an ordinary, which, according to Guillim, contains the fourth part of the chief.

FILMER, Sir Robert, an English writer of the 17th c., who upheld in the extreme degree "the divine right of kings." He assumed that the father was the ruler of the family and the king was the father of his people, and both were absolute rulers with power even to take life. It is doubtful if his opinions, which occasioned violent discussion in his day, would have been heard of in these times, if Locke had not undertaken, in his *Treatise on Government*, seriously to controvert them.

FILLMORE, a co. in s.e. Minnesota, on the Iowa border, on Root river, intersected by the Southern Minnesota railroad; 864 sq.m.; pop. '75, 28,337. The surface is undulating prairie, with forests of good timber. The soil is fertile; productions, corn, wheat, oats, butter, etc. Limestone underlies much of the surface. Co. seat, Preston.

FILLMORE, a co. in s.e. Nebraska, drained by a tributary of Big Blue river; 576 sq.m.; pop. '75, 5,373. Undulating surface, and fertile soil, but not much cultivated. Co. seat, Geneva.

FILLMORE, Millard, an American statesman, ex-president of the United States, was b. on 7th Jan., 1800, at Summer Hill, in the state of New York. Born of English parents, in rather straitened circumstances, all the education he received was the very imperfect instruction furnished by the village school. At the age of 15, he was sent to the county of Livingston, there to learn the drapery trade, and soon afterwards was bound apprentice to a wool-carder in his native village. During the four years he labored at this occupation, he used every means at his disposal to cultivate his mind, devoting his evenings to reading and study. In his 19th year, he made the acquaintance of a lawyer named Wood, who discovering in the young man talents worthy of a loftier sphere, took an interest in him, and offered him a situation in his office, at the same time supplying him with funds for the prosecution of his studies for the legal profession. The attention bestowed upon him by his benefactor was not thrown away. He entered with ardor upon the course thus marked out for him, and in order that he might not be too great a burden upon his friend, devoted a part of his time to conducting a school. He removed to Buffalo in 1821 in order to complete his studies, and in 1823 was admitted a member of the bar. A brilliant career was thus opened up for him, and he delayed not to pursue it. He gradually acquired both means and reputation. In 1829, he began his political career, being in that year chosen as a representative of the county of Erie in the legislature of New York, where he entered the ranks of the whig party, at that time in opposition. Here his probity and modesty soon gained him universal esteem. He was mainly instrumental in procuring the abolition of imprisonment for debt in the state of New York. In 1832, F. was elected a member of congress, and such were the statesmanlike qualities displayed by him, that he was several times re-elected; but in 1844, he resumed his profession of advocate. In 1847, however, he again returned to public life, being elected by a large majority to the post of comptroller of New York; and in the following year he was made vice-president of the United States. The unexpected death of gen. Taylor in July, 1850, leaving the office of president vacant, F. was raised to that high office, which he held till 1853. His presidency was marked by the passing of some very salutary measures, notwithstanding that his party were in the minority. He promoted as far as he could the progress of

exploration and discovery, at home and abroad. In 1855, F. visited Europe, and on his return in 1856, he was again nominated for the presidency, but was not returned. F. took no active part in the civil war; though nominally he sided with the union. After the expiry of his term of office, he retired to Buffalo, where he died in 1874.

FILTER—FILTRATION. When solid matter is suspended in a liquid in which it is insoluble, it may be separated by various means. Under the article FINING, various methods of causing such suspended matter to collect together and sink to the bottom or float on the surface, and thereby clearing the liquid, are described. The process of filtration consists in passing the liquid through some porous substance, the interstices of which are too small to admit of the passage of the solid particles, the principle of the action being the same as that of a sieve; but as the particles of fluids are immeasurably small, the pores must be extremely minute.

One of the simplest forms of filter is that commonly used in chemical laboratories for separating precipitates, etc. A square or circular piece of blotting-paper is folded in four, the corner where the four folds meet is placed downwards in a funnel, and one side is partly opened, so that the paper forms a lining to the funnel. The liquid passes through the pores of the paper, and the solid matter rests upon it. The chief advantages of this filter are its simplicity, and the ease with which the solid matter may be removed and examined.

A simple water-filter for domestic purposes is sometimes made by stuffing a piece of sponge in the bottom of a funnel or the hole of a flower-pot, and then placing above this a layer of pebbles, then a layer of coarse sand, and above this a layer of pounded charcoal three or four inches in depth. Another layer of pebbles should be placed above the charcoal, to prevent it from being stirred up when the water is poured in. It is obvious that such a filter will require occasional cleaning, as the suspended impurities are left behind on the charcoal, etc. This is best done by renewing the charcoal, etc., and taking out the sponge and washing it. By a small addition to this, a cottage-filter may be made, which, for practical use, is quite equal to the most expensive filters of corresponding size. It consists of two flower-pots, one above the other; the lower one is fitter with the sponge and filtering layers above described, and the upper one with a sponge only. The upper pot should be the largest, and if the lower one is strong, the upper one may stand in it, or a piece of wood with a hole to receive the upper pot may rest upon the rim of the lower one. The two pots thus arranged are placed upon a three-legged stool with a hole in it, through which the projecting part of the lower sponge passes, and the water drops into a jug placed below. The upper pot serves as a reservoir, and its sponge stops the coarser impurities, and thus the filtering layers of the lower one may be used for two or three years without being renewed, if the upper sponge be occasionally cleaned. Care must be taken to wedge the upper sponge tightly enough, to prevent the water passing from the upper pot more rapidly than it can filter through the lower one.

A great variety of filters are made on a similar principle to the above, but constructed of ornamental earthenware or porcelain vessels of suitable shape. It would occupy too much space to enter upon the merits of the filters of different makers, especially as there is really very little difference between them in point of efficiency, and nearly all the domestic filters that are offered for sale are well adapted for their required purpose. In purchasing a filter, the buyer must not be satisfied with merely seeing that the water which has passed through it is rendered perfectly transparent—this is so easily done by a new and clean filter—but he should see that the filter is so constructed as to admit of being readily cleansed, for the residual matter must lodge somewhere, and must be somehow removed. When large quantities of water have to be filtered, this becomes a serious difficulty, and many ingenious modes of overcoming it have been devised. In most of these, water is made to *ascend* through the filtering medium, in order that the impurities collected on it may fall back into the impure water. Leloge's ascending filter consists of four compartments, one above the other; the upper part, containing the impure water, is equal in capacity to the other three. This communicates by a tube with the lower one, which is of small height. The top of this is formed by a piece of porous filtering-stone, through which alone the water can pass into the third compartment, which is filled with charcoal, and covered with another plate of porous stone. The fourth compartment, immediately above the third, receives the filtered water, which has been forced through the lower stone, the charcoal, and the upper stone. A tap is affixed to this, to draw off the filtered water, and a plug to the second or lower compartment, to remove the sediment. At the top of the tube by which the first and second compartments communicate, a sponge may be placed to stop some of the grosser impurities.

Since 1831, when this filter was contrived, a number of ascending filters have been patented, many of them being merely trifling modifications of this. Bird's siphon filter is a cylindrical pewter vessel containing the filtering media, and to it is attached a long coil of flexible pewter pipe. When used, the cylinder is immersed in the water-butt or cistern, and the pipe uncoiled and bent over the edge of the cistern, and brought down considerably below the level of the water. It is then started by applying the mouth to the lower end, and sucking it till the water begins to flow, after which it continues to

do so, and keeps up a large supply of clear water. This, of course, is an ascending filter, and the upward pressure is proportionate to the difference between the height of the water in the cistern and that of the lower end of the exit tube. See SIPHON. Sterling's filtering tanks are slate cisterns divided into compartments, the water entering the first, then passing through a coarse filter to a second, and from there through a finer filter to the main receptacle, where the filtered water is stored and drawn off for use.

A common water-butt or cistern may be made to filter the water it receives by the following means: Divide the cistern or butt into two compartments, an upper and a lower, by means of a water-tight partition or false bottom; then take a wooden box or small barrel, and perforate it closely with holes; fit a tube into it, reaching to about the middle of the inside, and projecting outside a little distance; fill the box or barrel with powdered charcoal, tightly rammed, and cover it with a bag of felt; then fit the projecting part of the tube into the middle of the false bottom. It is evident that water can only pass from the upper to the lower compartment by going through the felt, the charcoal, and the tube, and thus, if the upper part receives the supply, and the water for use is drawn from the lower part, the whole will be filtered. It is easily cleaned by removing the felt and washing it.

Various means of compressing carbon into solid porous masses have been patented, and filters are made in which the water passes through blocks of this compressed carbon. Most of these are well adapted for the purpose, but their asserted superiority over filters composed of layers of sand and charcoal is doubtful. A very elegant and convenient portable filter for soldiers, travelers, and others who may require to drink from turbid ponds and rivers, was constructed of Ransome's filtering stone, and is also made of the compressed carbon. A small cylinder of the stone or carbon is connected with a flexible India-rubber tube in such a manner that the cylinder may be immersed in a river, the mouth applied to a mouth-piece at the other end of the tube, and the water drawn through the filtering cylinder.

The filtration of water on a large scale will be treated of under WATER-SUPPLY.

Some very interesting experiments were made by Mr. H. M. Witt, to ascertain whether soluble matter, such as common salt, is in any degree removed from water by filtration. Theoretically, it has been assumed that this is impossible, since the filter only acts mechanically in stopping suspended particles; but the results of Mr. Witt's experiments show that from 5 to 15 per cent of the soluble salts were separated by sand-filters such as above described. This is a curious and interesting subject, well worthy of further investigation. Another most important matter, on which a series of accurate experiments is required, is to ascertain to what extent soluble organic matter may be decomposed by filtration, especially by charcoal filters, and to ascertain how long charcoal and other porous matter retains its property of acting on organic matter in watery solution. The power of dry charcoal in decomposing organic matter in a gaseous state is well established (see below), and it is also well known that fresh charcoal acts powerfully upon organic matter in solutions, but the extent to which this power is retained in the charcoal of a filter in continuous action has not been satisfactorily ascertained. This is of the highest importance, as it sometimes happens that water of brilliant transparency, and most pleasant to drink, on account of the carbonic acid it contains, is charged with such an amount of poisonous organic matter as to render its use as a daily beverage very dangerous. Charcoal obtained from burning bones is still more efficacious than charcoal from wood. A filter of animal charcoal will render London porter colorless. Loam and clay have similar properties. Prof. Way found that putrid urine and sewer water, when passed through clay, dropped from the filter colorless and inoffensive.

When a liquid contains mucilaginous or other matter having viscous properties, there is considerable difficulty in filtering it, as the pores of the medium become filled up and made water-tight. Special filters are therefore required for sirups, oils, etc. Such liquids as ale, beer, etc., would be exceedingly difficult to filter, and therefore they are clarified by the processes described under FINING. Oil is usually passed through long bags made of twilled cotton cloth (Canton flannel). These are commonly 4 to 8 ft. long, and 12 to 15 in. in diameter, and are inclosed in coarse canvas bags, 8 or 10 in. in diameter, and thus the inner filtering-bag is corrugated or creased, and a large surface in proportion to its size is thus presented. Sirups are filtered on a small scale by confectioners, etc., by passing them through conical flannel bags, and on a large scale in the *creased bag-filter* just described. Thick sirups have to be diluted or clarified with white of egg, to collect the sediment into masses, and then they may be filtered through a coarse cloth strainer. Vegetable juices generally require to be treated in this manner.

The simple laboratory filter has to be modified when strong acid or alkaline solutions, or substances which are decomposed by organic matter, require filtration. Pure silicious sand, a plug of asbestos, pounded glass, or clean charcoal, are used for this purpose. Böttger recommends gun-cotton as a filter for such purposes. He has used it for concentrated nitric acid, fuming sulphuric acid, chromic acid, permanganate of potash, and concentrated solutions of potash and aqua regia. He says that properly prepared gun-cotton is only attacked at ordinary temperatures by acetic ether.

Filtering paper for laboratory purposes requires to be freed from inorganic impuri-

ties that are soluble in acids, etc.; this is effected by washing the paper with hydrochloric acid, or, when thick, with nitric and hydrochloric acid, and removing the acid by washing thoroughly with distilled water.

When a considerable quantity of liquid has to pass through a filter, it is sometimes desirable that it should be made to feed itself. In the laboratory, this is done by inverting a flask filled with the liquid over the filtering funnel, the mouth of the flask just touching the surface of the liquid when at the desired height in the funnel. As soon as it sinks below this, air enters the flask, and some liquid falls into the funnel. On a large scale, self-acting filters are fed by the common contrivance of a ball-cock and supply-pipe.

Air-Filters.—The extraordinary powers of charcoal in disinfecting the gaseous products evolved from decomposing animal and vegetable matter, have been made available by Dr. Stenhouse in constructing an apparatus for purifying air that is made to pass through it. A suitable cage, containing charcoal in small fragments, is fitted to the opening from which the deleterious gases issue, and is found to render them perfectly inodorous, and probably innocuous. The first application of this was made in 1854, when a charcoal air-filter was fitted up in the justice-room of the mansion house, London, the window of which opens above a large urinal, the smell of which was very offensive in the room. The filter at once destroyed the nuisance, and the charcoal has been found to last many years without the need of renewal. 103 of such filters have been applied to the outlets of the sewers of one district of the city of London, and no bad smell is observable where they are placed, and no obstruction offered to the ventilation of the sewers. They have been applied with like results in two or three county towns. The subject is fully treated by Dr. Stenhouse in a letter to the lord mayor, published by Churchill (London). Charcoal respirators are small air-filters of the same kind applied to the mouth. See RESPIRATOR.

FILUM AQUÆ, the imaginary line along the middle of a stream which is the boundary of property on the opposing shores. Boundaries are usually specially defined, but in the absence of express terms the line between two nations, or states, or counties, or private farms, if it run along a stream, would be in the middle of such stream, and if an island should interpose the line would divide it to each party by a line corresponding to the course of the stream from the middle of the channel above to the middle of the channel below.

FIMBRIATED (Lat. *fimbria*, a border or hem), is said, in heraldry, of an ordinary having a narrow border or edging of another tincture.

FINA'LE, a t. of n. Italy, in the province of Modena, on the Panaro, 22 m. n.e. from Modena. It is surrounded by walls, has manufactures of linen and silk, and an active general trade. Pop. 4,500.

FINA'LE, the name given to that part of a musical composition which finishes the act of an opera; also to the last movement of an instrumental composition, as in the symphony, quartet, quintet, sonata, etc. The character of the finale, in purely instrumental works, is always lively. In the opera, it depends on the subject, while in some operas the finale consists of an aria alone, as in Mozart's *Figaro*, instead of the usual full concerted music for soli and chorus.

FINAL JUDGMENT. The meaning of this term in the law of Scotland having led to some dispute, an act of Sederunt (q.v.) was passed on the 11th July, 1828, declaring it to be applicable to a case in which "the whole merits of the cause have been disposed of, although no decision has been given as to expenses, or, if expenses have been found due, although they have not been modified or decerned for." The importance of the definition arises from the fact, that only final judgments can be carried by advocation from the inferior to the superior courts. "The whole merits of the cause" has been held to mean, not only the merits of the action to which the advocator is a party, but also those of any other conjoined with it. If the parties in the conjoined action will not proceed to have it determined, the advocator ought to apply to the inferior judge, stating his intention to advocate, and praying him to call on the parties to proceed with the conjoined process; and, failing their doing so, to disjoin the causes, which disjunction will render an advocation competent. Shand's *Practice*, i. p. 454. In advocations (q.v.) and suspensions (q.v.), if the record be closed, and the proof concluded in the inferior court, the case may be taken at once to the inner house without a judgment of the lord ordinary, 13 and 14 Vict. c. 36. In order to warrant an appeal to the circuit court in a civil cause (where otherwise competent) not only the merits must have been disposed of, but the expenses modified and decerned for.

FINANCE', a French word incorporated with our language, means the art of managing money matters, the person who professes this art being called a financier. Finance, in the plural, is often used for money itself, but still with a reference to the purpose to which it is to be applied, as where the finances of a country are said to have improved or fallen off—that is to say, have become abundant or scanty according to the expenditure of the country. Sometimes the word is applied to private wealth, but it is properly applicable to public funds. We use it in this country rather in a political and economic sense than officially, but in France there have been, from time to time, comp-

trollers-general of finance, councils of finance, bureaus of finance, etc. Many statesmen have been spoken of as great financiers, from the talent which they have shown for adjusting national revenue and expenditure, as Colbert, Turgot, and Necker in France, and Godolphin and Peel in Britain. As a branch of statesmanship, finance is intimately connected with other branches. In questions of national policy—such as, whether a state can go to war or not—the financier is the person who is expected to count the cost, and say how the necessary funds are to be obtained. In the question, whether an unpopular or oppressive tax is to be abolished, the financier is an authority on the question, whether the government can do without it. Hence, there is a special connection between finance and taxation, which has become closer and stronger since the progress of political economy has shown that the taxes which are the most productive, and even the most easily collected, are not always the best, looking at the gain or loss of a nation in the long-run. Turgot said that finance was the art of plucking the fowl without making it cry. On this notion, the principle of indirect taxation achieved its popularity. For instance, customs duties seem to fall on no one. The importer and the retailer add them to the price of the article, and the ultimate purchaser only knows that the article is dear without experiencing the sense of hardship felt by one who pays out money directly in the shape of a tax. But many indirect taxes have, on the other hand, been found to affect the trade and the wealth of communities to an extent which has made them very deleterious in comparison with direct taxes. See further on matters connected with finance the heads CUSTOMS; DEBT, NATIONAL; CORN LAWS; EXCISE; FREE TRADE; TAXATION; REVENUE.

FINBACK. See RORQUAL, *ante*.

FINCH (Ger. *Fink;* for the origin of the word, see CHAFFINCH), the popular name of a great number of species of little birds of the order *insessores*, and tribe *conirostres*. Many of them have great powers of song, and are called *hard-billed song-birds*, in contradistinction to the warblers (*sylviadæ*) or *soft-billed song-birds*. The name F. is sometimes used as equivalent to *fringillidæ* (q.v.), either in its more extensive or more restricted application; but the limits of its popular use are very indeterminate, and some birds are equally known as finches and as linnets, or as grosbeaks, etc. The word F. often forms part of the popular name of birds of this family, as bull-finch, chaffinch, haw-finch, pine-finch, etc.

FINDER OF GOODS. The finder acquires a special property in goods, which is available to him against all the world except the true owner; but before appropriating them to his own use, he must use every reasonable means to discover the owner. It has been decided that if the property had not been designedly abandoned, and the finder knew who the owner was, or knew that he could have discovered him, he was guilty of larceny in keeping and appropriating the articles to his own use. *R. v.* Thurborn, 1 Denison, c.c. 393; Merry *v.* Green, 7 M. and W. 623. In the latter case, in which a person purchased, at a public auction, a bureau, in which he afterwares discovered, in a secret drawer a purse containing money, which he appropriated to his own use, Mr. Baron Parke thus laid down the law. "The old rule, that 'if one lose his goods, and another find them, though he convert them *animo furandi* to his own use, it is no larceny,' has undergone in more recent times some limitations. One is, that if the finder knows who the owner of the lost chattel is, or if, from any mark upon it, or the circumstances under which it is found, the owner could be reasonably ascertained, then the fraudulent conversion, *animo furandi*, constitutes a larceny." This law, however, although in most cases clear, is, in others, extremely difficult in application, and judges and juries often go wrong. The question for the jury is not whether they think the finder could have discovered the owner, but whether he believed that he could; and if not satisfied as to this, they cannot convict him of larceny. It is a mistake to suppose that the finder is bound to advertise, or use extraordinary means to discover the owner; indeed he cannot claim such expenses from the real owner, if he appear.

FINDHORN, a river rising on the w. side of the Monadh Liadh mountains, in the e. of Inverness-shire. It runs n.e. through the counties of Inverness, Nairn, and Elgin, in the valley of Strathdearn, passes Forres, and enters the Moray firth at the village of Findhorn by a lagoon three by one and a half miles in extent, after a course of about 90 miles. Its waters abound in salmon and trout. Its basin consists of gneiss in the upper part, and of old red sandstone in the lower. At one place, it rose nearly 50 ft. in the great floods of Aug., 1829, known as the "Moray floods," and did much damage. West of the mouth of the F. are the Culbin sands, in one part 118 ft. high, and covering 9,500 acres of a formerly fertile tract.

FINDLAY, seat of justice of Hancock co., Ohio, 46 m. s. of Toledo, on a fork of the Auglaize river, reached by the Lake Erie and Louisville railroad; pop. '70, 3,315. It does considerable manufacturing.

FINE OF LANDS, in England, fictitious proceedings formerly in common use in order to transfer or secure real property by a mode more efficacious than an ordinary conveyance. A fine is defined by Coke, quoting from Glanville, an amicable composition and final agreement by leave and license of the king or his justiciaries; and such indeed it was in its original effect, and it was called a fine because it put a termination

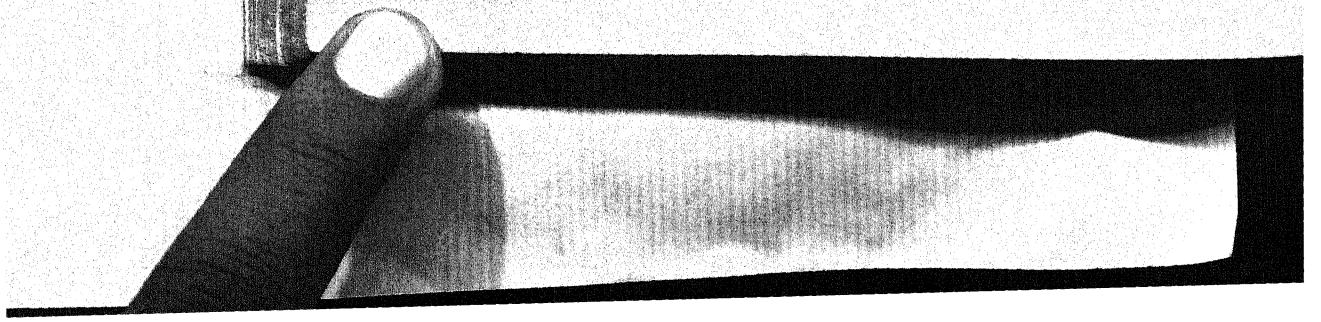
(*finis*) to all litigation between the parties, and those claiming through them, in regard to all matters touching the suit. The proceedings in a fine were shortly as follows: The party to whom the land was to be conveyed commenced a fictitious suit against the vendor. But the case was no sooner in court than the plaintiff asked leave to agree or settle with the defendant. This leave having been obtained, a covenant was entered into whereby the vendor or defendant, called the *cognizor*, recognized the right of the plaintiff, called the *cognizee*, to the lands, of which he admitted that the plaintiff was wrongfully kept from the possession. These proceedings, which at first were real, were afterwards adopted universally without having a shadow of foundation in fact. This solemn farce having been completed, a *note* of the fine, being an abstract of the covenant, the names of the parties, and the parcels of the land, was entered on the rolls of the court; and the business was concluded by what was called the *foot* of the fine, setting forth the parties, the time and place of agreement, and before whom the fine was levied. The whole was embodied in indentures commencing *hæc est finalis concordia*. It was necessary that a fine should be levied openly in the court of common pleas, or before the chief-justice of that court, or before two or more commissioners appointed in the country. Fines were of four kinds, which need not be specified here. In order that a fine should have full effect, it required to be levied with *proclamations*, i.e., open proclamation of the transaction in court. A fine so levied cut off the right even of strangers who fail to assert their claim during the period allowed by law; hence an estate was said to be barred by fine and non-claim. A fine levied by a married woman had the effect of cutting off all right she might have in the lands, and was the only mode by which a married woman could convey lands; and in order to protect her from undue influence, she was privately examined as to the voluntary nature of the transaction. A fine levied by tenant in tail cut off the estate tail, but did not affect remainders; hence, though a fine was sometimes used to bar an entail, the usual method was by common recovery (q.v.). But while a recovery was the most effectual method of barring an entail, it required the consent of the tenant in possession. Where, then, that consent could not be obtained, or where the tenant in tail was at the same time tenant in fee in remainder, a fine was a convenient mode of barring the entail. The statute *De Donis* prohibited fines as a means of barring entails, but this restriction was removed by 32 Hen. VIII. c. 36.

The old law as to fines has been abolished by the *Fines and Recoveries Act*, 3 and 4 Will. IV. c. 74. This act was passed for the purpose of abolishing the cumbrous machinery used in the transfer of land according to the ancient forms and fictions. The act abolishes all the fictions formerly in use. In regard to fines and recoveries by heirs of entail, it permits every tenant in tail of freehold land whether in possession, in remainder, or contingency, to dispose of the lands for an estate of fee-simple absolute, or any less estate, by any of the ordinary conveyances, except a will, at common law, or under the statute of uses (q.v.). The conveyance must be registered in the court of chancery within six months after its execution. But where there is an estate of freehold prior to the estate tail, the act requires that the consent of the tenant of the freehold shall be necessary in order to give full effect to the conveyance. This person is called the *protector of the settlement*. Where a conveyance is made without consent of the protector, it has the effect of barring those only who would succeed under the heir by whom it is executed. This is precisely the effect which under the old law belonged to a recovery without the consent of the tenant to the *præcipe*, and of a fine levied by a tenant in tail; so that the statute, while it abolishes the fictions, sustains entails as family settlements to the limited effect which they formerly possessed. In regard to fines by married women, the act provides that a feme coverte (q.v.) may dispose by deed of any lands, or of money subject to be invested in the purchase of lands. It is necessary, unless specially dispensed with by the court, that her husband should concur in the conveyance, and that she should acknowledge it before a judge of one of the superior courts at Westminster, or a master in chancery, or two of the commissioners appointed for that purpose under the act.

FINGAL, the name of the hero in the *Poems of Ossian*, written in the last century by James Macpherson, and based on the ancient traditions of the Gaelic people of Scotland and Ireland, some of which are still known among the Celtic people of the country. The *Finn*, or *Find*, of these old stories was the *Rig*, or king of the *Fians*, or *Fenians*, of Leinster, in the time of the monarch Cormac, son of Art, and he resided at a dun, or fort, at Almhain, now the hill of Allen, in the co. of Kildare, whence comes the name of the bog of Allen, given to the great central bogs of Ireland. *Find* is said to have been killed 283 A.D., at Ath Brea on the Boyne, by a fisherman who thought to become celebrated from the act. Some Norse antiquarians say that the terms *Fingal* and *Dubgal*, used by the early Irish, mean "fair" and "dark" stranger, "gal" signifying a foreigner, or invader; and that the "fair" were the Norwegian, and the "dark" the Danish pirates who ravaged Ireland about the close of the 8th century.

FINGAL'S CAVE. See STAFFA.

FINGER-BOARD, that part of a stringed musical instrument, as in the violin, violoncello, guitar, etc., which is made of ebony-wood, and glued on the neck of the instrument, and shaped on the top somewhat round, to suit the position in which the strings



lie on the nut and the bridge. At the lower end, the finger-board projects over the sounding-board of all those instruments played with the bow, while in the guitar species the finger-board is glued down on both neck and sounding-board. The strings are stretched along the finger-board from the nut at the top to the bridge at the lower end, and are pressed down by the fingers of the left hand, to make the different notes in music; while the right hand produces the sound either by a bow or the points of the fingers.

FINGERS. See HAND.

FINGERS-AND-TOES, the popular name of a disease in turnips, called also Anbury (q.v.).

FINIAL, an ornament, generally carved to resemble foliage, which forms the termination of pinnacles, gables, spires, and other portions of Gothic architecture. There are traces of foliated terminations, both in stone and metal, on the pediments of classic buildings (see ACROTERION), but it was not till the 12th c. that the F. proper was introduced. During the latter part of that c. and the whole of the 13th c., finials of the most perfect form and of infinite variety were used as the crowning ornaments of every salient point in the buildings of the period. The architects of the 14th c., in finials, as in other ornaments, imitated more closely the forms of natural foliage; but their finials had neither the variety of design nor the vigor of outline of those of the preceding century.

In the 15th and 16th centuries, the finials became more and more meager in form, and are frequently only four crockets set upon a bare pyramidal terminal. Some variety of effect is often obtained during this period by surmounting the F. with a gilded vane. This is common in Tudor and domestic architecture. Finials were carved both in stone and wood, and in the latter material with great delicacy and minuteness. In connection with metal-work, finials of metal were used, and whatever the material adopted, its natural capabilities were made a source of special beauty.

The F. is one of the most effective ornaments of Gothic architecture, and when that style was succeeded by the revival of classic, in the reign of queen Elizabeth, our forefathers could not persuade themselves to part with the finials to their buildings. We thus find in Elizabethan architecture a great variety of finials; they are, however, almost entirely of a geometric form, and without foliage, and are frequently, especially when terminating wooden gables, combinations of F. and vane partly wood and partly iron. In the stricter classic which succeeded the Elizabethan, some traces of the favorite F. still remain in the balls, obelisks, etc., used as terminations, and also in the shields and supporters (themselves a remnant of feudalism) which form the crowning ornament of gate-piers, pedestals, etc.

FINING, the process of clearing turbid liquors, such as beer, wine, etc. The simplest mode of F. is by passing the liquor through a porous substance that retains the solids and allows the clear liquid to pass through (see FILTER); but this method is only applicable to particles mechanically suspended in a limpid liquid. When the liquid contains mucilaginous or other matter, that readily clogs the filter, some other means of F. must be used. Such is the case with all malt liquors and most wines when turbid. When in good condition, these do not usually require F., as the suspended matter agglomerates, and sinks to the bottom shortly after the fermentation is completed. When this does not take place, some means of promoting such action are usually adopted. One of the simplest is to add soluble albumen, such as white of egg, to a portion of the liquid, and after beating it well in this, to add the mixture, and stir it into the whole of the liquid. Upon the application of heat, the albumen coagulates and contracts from its diffusion into a scum, enveloping and drawing together the suspended matter. The scum is then easily removed. This method is adopted for sirups and other liquids that may be heated without mischief. In making clear soups, the albumen of the meat performs this function. As alcohol coagulates albumen, it may be used for fining wines and cordials without the application of heat. It is generally used for red wines. Malt liquors are usually fined by means of gelatine, either isinglass or cheaper substitutes being used. One pound of isinglass is soaked in three or four pints of water, or sour beer, then more sour liquor added as the isinglass swells, until it amounts to about a gallon. The jelly thus formed is next dissolved in seven or eight gallons of the liquor to be fined. This solution, having the consistence of a sirup, is called "brewers' finings," and about a pint to a pint and a half is added to a barrel of ale or porter, or to a hogshead of cider or wine. The action of this depends upon the combination of the gelatine with the astringent matter (tannic acid) of the liquor, forming thereby an insoluble solid, which sinks to the bottom, and carries with it, like the coagulating albumen, the suspended matter; but as the flavor of malt liquors partly depends upon the astringents they contain, the F. affects the flavor; the astringents also help to preserve the liquor, and hence their removal is in this respect disadvantageous. Malt liquors thus fined do not "stand well on draught." The use of gelatine for F. red wines is objectional, as in most of these the astringent flavor is an esteemed quality, and therefore albumen is preferred.

Other methods of F. are adopted. Sugar of lead is sometimes added, and afterwards, one half its weight of sulphate of potash dissolved in water. By this means, an

insoluble sulphate of lead is precipitated, which in subsiding carries down other matters with it. This is a dangerous process, the salts of lead being poisonous. If properly conducted, the whole of the lead may be precipitated, but a casual mistake in the quantities might cause the death of many people. Ox-blood is used in the same manner as albumen and isinglass. Lime, alum, alcohol, and acids act by coagulating albumen, etc., contained in the liquor. Plaster of Paris, clay, and even sand, are sometimes used to carry down the suspended matters. A strip of isinglass or a piece of dried sole-skin is often used for F. coffee, and it acts in the manner above described. Liquors that are unusually difficult to fine are called "stubborn" by coopers and cellarmen.

FINISTÈRE, or FINISTERRE (Lat. *Finis terræ*, "land's end"), a department at the western extremity of France, comprehending a part of the former duchy of Bretagne, has an area of 2,648 sq.m., and a pop. (1876) of 666,106. It is traversed from e. to w. by two low but picturesque chains of hills. Its coast is very ragged and broken, its shores bristling with dangerous granite rocks, and fringed with many islands. The soil, one third of which is occupied by sandy tracts and marshes, is moderately productive; and, owing to the vicinity of the sea, which washes the northern, western, and southern shores of the department, the climate is mild and humid. Corn, hemp, and flax are grown in considerable quantities. In the valleys, smiling meadows everywhere occur. The silver and lead mines of F. are very valuable; those of Pouillaouen and Huelgoet being about the richest in France. Its principal rivers are the Aulne, the Elorn, and the Odet. The first of these is connected by a canal with the Blavet, and forms part of the great line of communication by water from Brest to Nantes. This department is divided into the following five arrondissements: Quimper, Brest, Châteaulin, Morlaix, and Quimperlé. Quimper is the chief town.

FINISTERRE, CAPE, or LAND'S END, is the name given to a promontory at the n.w. extremity of Spain, in lat. 42° 54′ n., and long. about 9° 20′ west. It is the *Promontorium Nerium* of the ancients.

FINLAND (Fin. *Suomesimaa*, land of lakes and marshes) is a grand duchy of Russia, lying between 59° and 70° n. lat., and between 21° and 33° e. long., is about 750 m. from n. to s., and has an average breadth of about 185 miles. According to the Russian census of 1851, the pop. was 1,636,915, and it has maintained a pretty constant rate of increase: in 1875 it was 1,912,647. The area of F. may be estimated at about 140,000 sq.m., of which nearly one third is occupied by marshes and lakes. The largest of these sheets of water, independently of lake Ladoga, which belongs partly to the Russian province of Olonetz, are lakes Puruvesi, Payane, Enara, and Saima; the last of these, which is about 180 m. in length, constitutes a portion of the system of water-communication which has been established between the central parts of the country and the gulf of Finland. The lakes are especially numerous in the s.w. of F., where they are almost all united together by rivers and waterfalls, round the central lake of Pyhäjärvi. The surface is a table-land, from 400 to 600 ft. above the level of the sea, with occasional higher elevations. There are, however, no mountain-ranges, and hence the rivers are unimportant; but in the n. the country is intersected by a sandy ridge known as the "Maanselkae," which merges, under the name of the Lapintunturit mountains, into the great Lappo-Norwegian Alpine chain. The coast-line is generally low, but to the s. it is skirted by numerous rocky islands, separated from the land by narrow channels, difficult of navigation, but well adapted for purposes of defense against hostile attacks from the sea. The principal geological formations are friable granite, hard limestone, and slate. The forests of F. are still very abundant, although they have been recklessly cut down in many parts of the country for the sake of their ashes, which are used to stimulate the soil, whose natural poverty requires to be counteracted by frequent manuring. Pine and fir predominate, but birch, beech, oak, etc., thrive in the s. parts of the country, where some good pasture-land is to be met with. Since the incorporation of F. with Russia, agriculture has declined, and fishing and cattle-breeding increased in importance. The exports from F. in 1873 amounted to 93,320,000 marks, equivalent to about £3,500,000. The most valuable are the products of the forests, as timber, pitch, potash, tar, and rosin; for the supply of grain is scarcely larger than the home demand, although at one time F. was regarded as the granary of Sweden for barley and rye. Few fruits ripen except hardy berries; and in the extreme n., vegetation is almost limited to mosses and liverworts. F. yields some copper, iron, lime, and slate; but it produces scarcely any salt, which constitutes one of the principal articles of import. Reindeer, wolves, elks, beavers, and various kinds of game abound; while the numerous lakes, and the adjacent gulfs, supply the inhabitants with an abundance of salmon, herring, and other fish. The climate is rigorous, and winter, which lasts seven or eight months, is succeeded by a brief spring, which passes almost suddenly into a short but hot summer of six or seven weeks, succeeded in its turn by a rainy season, which ushers in the return of cold weather. In the n., the sun is absent during a part of Dec. and Jan., and almost perpetually above the horizon during the short summer. F. is divided into eight lænes or governments—Nyland, Abo-Biorneborg, Tawastehuus, Wiborg, Kuopio, St. Michel, Wasa, Uleaborg, which are included in the 3 dioceses of Abo, Borgo, and Kuopio, and contain in all 214 parishes. The predominant form of religion is the Lutheran, but the Greek church has of late years been gaining ground.

The courts of law are held at Abo (the ancient capital), Wasa, and Wiborg; and there is one university, founded in 1640 at Abo, but removed to the present capital, Helsingfors, in 1829. The highest administrative authority is vested in the imperial senate for F., consisting of 18 members, nominated by the emperor, and presided over by the governor-general of Finland. The estimated revenue of F. in 1875 was 25,984,551 marks; the estimated expenditure was 25,791,153 marks. The army numbers now only 679 men, but has the privilege of serving in distinct corps, without being incorporated in the general forces of the empire. The naval force also forms a distinct squadron, under its own national flag.

The early history of F. is shrouded in obscurity, and little is known of the people before the 12th c., when Eric the saint, king of Sweden, exasperated by their piratical inroads, undertook a crusade against them, and compelled them, by force of arms, to profess Christianity. The hold which the Swedes then acquired over the country was never wholly lost till 1809, when Sweden secured peace with Russia by the cession of all F. and the island of Aland; before that time, however, the Russians had at various epochs wrested portions of the Finnish territories from the Swedes, while F. had been for centuries the perpetual cause and scene of wars between the two nations. The Swedish language had taken such deep root in F., that the efforts of the Russian government to displace it in favor of the native Finnish, have hitherto met with only partial success, and in many parts of the country, the people still openly prefer their old masters. The inhabitants, who call themselves *Suomes*, and are denominated *Tschudes* by the Russians, have, however, no affinity of race with the Swedes, and may be regarded as differing from all other European nations, excepting the Lapps and the Finmarkers, to whom they are very probably allied. See FINNS and FINNISH LITERATURE. For further information, see Gerschau, *Versuch einer Gesch. Finland* (1821); Stockfleth, *Bidrag til Kunds. om Finnerne i Norge;* Topelius, *Finland fremställdt i Teckning* (1860); *Zeitschrift der Gesellschaft für Erdkunde* (vol. vi., 1871).

FINLAND, GULF OF, the eastern arm of the Baltic sea, between 22° and 30° e. long., and between 59° and 61° n. lat. Its coasts are entirely Russian territory. It receives the waters of the great lakes Onega and Ladoga. The water of the gulf is not deep, and only very slightly salt. The topography of the gulf of F., which has been thoroughly elucidated by Struve, forms an interesting part of the great work of the Russian survey of the Baltic.

FINLAY, GEORGE, a distinguished historian, was b. in Scotland about the commencement of the present century. Circumstances induced him to take up his residence in Athens, where he patiently and industriously devoted himself to the study of the later Greek history. The fruits of his labor and researches are contained in his *History of Greece under the Romans*, 146 B.C. *to* 717 A.D. (London, 1843; 2d ed 1857); *History of Greece from its Conquest by the Crusaders to its Conquest by the Turks, and of the Empire of Trebizond*, 1204–1461 A.D. (London, 1851); *History of the Byzantine and Greek Empires*, 716–1453 A.D. (London, 2 vols. 1853–54); *History of Greece under the Othoman and Venetian Dominion* (1854); and *History of the Greek Revolution* (1861). F. is not regarded as a philosophical historian in the highest sense of the term; but, from his earnest endeavors to obtain an accurate conception of the times about which he wrote, he was enabled to throw a flood of new light on modern Greek history. F. also exhibited a profound knowledge of Greek art, antiquities, and topography. In 1870, he edited Brue's *Journal of Ali Pacha's Campaign in* 1715. He died in 1875.

FINLEY, JAMES BRADLEY, 1781–1856; b. N. C.; became a Methodist minister in Ohio in 1809, and in 1814 had charge of the Wyandotte Indian mission. He was for nearly half a century one of the most prominent preachers of his denomination, and was several times a delegate to the general conference. Among his published works are his *Autobiography;* the *Wyandotte Mission;* and *Sketches of Western Methodism.*

FINLEY, SAMUEL, D.D., 1715–66; a native of Ireland; arrived in the United States in 1734, and became a Presbyterian minister in Philadelphia in 1740. For preaching in Connecticut in violation of a law which prohibited any person from preaching in the parishes of settled ministers without their consent, he was arrested as a vagrant and put out of the colony. In 1744, he was pastor and teacher of an academy in Maryland; in 1761, president of the college of New Jersey. His sermons have been published.

FINMARK, a province of Norway, and the most northern part of the continent of Europe, lying between 68° 30′ and 71° n. lat., and 17° and 31° e. long., constitutes Norwegian Lapland (q.v.). Area about 20,000 sq.m., of which three fourths are occupied by the continent, the rest belonging to the numerous islands which skirt its n.w. shores, and terminate in the North cape. Innumerable fiords and bays indent the coast. The interior is intersected by a snow-covered range of mountains, reaching an elevation of 4,000 ft.; the line of perpetual snow being here less than 3,000 ft. above the level of the sea. Agriculture is impracticable above an elevation of 100 ft.; a few berries are the only fruits that ripen; and although barley, potatoes, and a few other vegetables thrive in some parts, fish and game constitute almost the sole food of the inhabitants. In the n., where no trees are to be found, the turf of the marshes affords a good supply of fuel. The thin vegetable mold which covers the stony soil yields grass for the

sheep and cows, which graze on the declivities of the rocks skirting the fiords and creeks. The principal source of wealth is the reindeer in the n., and the cod-fisheries in the south. The population, which in 1875 numbered 24,071, consists principally of Lapps (see LAPLAND), a people of Finnish origin. Hammerfest, the capital of F. (70° 40′ n. lat.), is the most northern town of Europe.

FINN, HENRY J., 1788–1840; a native of cape Breton, who became a comedy actor in England, and appeared in many theaters in the United States, where he gained great popularity. He was one of the passengers lost in the burning of the steamboat *Lexington* on Long Island sound, Jan. 13, 1840.

FINNEY, CHARLES G., D.D., 1792–1875; born in Warren, Ct.; removed in childhood to Oneida co., N. Y. Having had the advantages of a common school, as a pupil until his 16th year, and as a teacher until he was 20, he then went to a high-school in New England and studied there for some time, instead of entering college as he had wished to do. At a later period still, he acquired some knowledge of Latin, Hebrew, and Greek. In 1818, he commenced the study of law at Adams, Jefferson co., N. Y. At that time he was ignorant of religion, but finding references to the Bible in his law-books, he procured one, and, beginning the examination of it in its bearings on points of law, became increasingly interested in it, and formed the habit of interpreting it as judges in court interpreted written laws. The theological views of the pastor of the church which he attended he describes as Calvinistic in a very high degree. Every position which the minister took, either in preaching or conversation, the law-student was accustomed to judge by the Bible, and to discuss with its author in very free and earnest yet friendly debate. He became deeply interested in religion, as a matter of personal importance, and was convinced that if the soul be immortal, he required a great inward change in order to be prepared for heaven. Satisfied by his own examination that the Bible is the true word of God, and brought face to face with the question whether to follow Christ or to pursue a worldly life, he did not delay his choice. Giving up the profession of law, of which he was becoming passionately fond, he determined to preach the Gospel as his life-work. His personal experience at that time was very remarkable. He received, after he believed, a baptism of the Holy Ghost which compelled him, in the abundance of his joy, to cry out when alone with God, that he could not live if the manifestation were not stayed. Beginning at once to preach in the social meetings of the church and in private conversation, he found very decided instances of conversion multiplying around him. After his licensure to preach, those revivals of religion at once began under his ministry which continued to be its great characteristic until its close. The doctrines he preached were "the voluntary total moral depravity of the unregenerate, the unalterable necessity of a radical change of heart by the Holy Ghost and by means of the truth, the divinity of the Lord Jesus Christ, his divine mission, perfect life, vicarious death (as an atonement for the sins of all mankind), and his resurrection; repentance, faith, justification by faith, and the doctrines kindred with these. The means used were simply preaching; much prayer, public and private, as an indispensable condition of promoting the work; conference among Christians; meetings to instruct earnest inquirers, and personal conversation." It had been, he says, "the common practice to set anxious persons to praying for a new heart, and to using means for their own conversion. This had produced in them the impression that they were willing to be Christians, and were taking pains to induce God to convert them. But I tried to make them understand that God was using the means with them, and not they with him; that he was willing and they were not; that he was ready and they were not; that he required present submission to his will and present acceptance of Christ; that all delay was only an evasion of present duty; that in praying for a new heart they were trying to throw the responsibility of their conversion on God; and that their efforts to do duty while they did not give their hearts to him were hypocritical and delusive." Under this style of preaching and of earnest efforts, revivals, resulting in the hopeful conversion of thousands, were witnessed at Evan's Mills, Antwerp, Gouverneur, De Kalb, Western, Rome, Utica, Auburn, Troy, Rochester, Buffalo, in the state of New York; at Wilmington, Del.; Philadelphia, Reading, Pa.; New York, Boston, Hartford, London, Edinburgh, Oberlin, O.; and many other places during a period of 50 years. In many of the places named the revivals were repeated, in different years, again and again. In London, it was estimated that on some occasions when he preached as many as 50,000 persons left their homes to attend the services; though, of course, the building could contain but a small portion of the number. In 1835, the college and theological seminary at Oberlin, O., were founded, with Mr. Finney as professor of theology and pastor of the college church. Arthur Tappan, of New York, at that time pledged his income of $100,000 per annum (except what was needed for the support of his own family) to the institution until it should be beyond pecuniary want. After 1860, Mr. Finney's strength being no longer equal to the extra labor abroad, he continued to work at home with great energy and success. In 1872, he resigned the pastoral office at Oberlin, but persevered in his labors in the seminary, where, having completed his last course of lectures in July, 1875, he died on a quiet Sunday in the following month, being within two weeks of 83 years of age. During 55 of these years his life had been a power in the

land. His most important published works are: *Guide to the Saviour; Lectures to Professing Christians; Lectures on Revivals of Religion; Sermons on Important Subjects; Systematic Theology;* and an *Autobiography*, written at the urgent solicitation of his friends, and published after his death.

FINNISH LANGUAGE AND LITERATURE. The Finnish language is used by the people known as Finns, inhabiting Finland, or dispersed throughout Lapland, the Baltic provinces, parts of Russia proper, both banks of the middle Volga, through Perm, Vologda, West Siberia, and Hungary, and constituting the western branch of the great Urato-Altaic family. There are five groups: 1. The Finns proper; 2. The Lapps; 3. The Peruvian Finns; 4. Volga Finns; 5. Ugrian Finns. 1. The first group comprises the Suomi or Suomelaisset, i.e., Finn men, who occupy nearly all Finland except a portion on the gulf of Bothnia, where Swedish is spoken; next, the Karelians, who extend from Russian Lapland s. to the gulf of Finland and lake Ladoga, and e. to the White sea and the shores of lake Onega; thirdly, the Chudic, a Slav term often applied to the whole group, but now restricted to the Veps, or northern Chud, and the Voltic or southern Chud, dwelling in scattered communities on the shores of lake Onega; and lastly, the Baltic Finns, including the Esthe or Esthonian, occupying the greater part of the southern coast of the gulf of Finland and the northern half of Livonia, and the Livonian or Krevinian, occupying a small corner in the n.w. of Courland. 2. The Lapps occupy the extreme n.w. of Russia, and some parts of northern Sweden and Norway. 3. The Permian Finns comprise the Siryenians, occupying an extensive region between 60° n. and the Arctic circle, and 50° e. and the Ural mountains, but mainly in the section of the government of Vologda; the Permian proper, formerly diffused throughout Perm, Vialka, Oufa, etc., now surviving in isolated communities mainly about the upper Kama; and the Votyak, occupying a relatively compact territory in Viatka as far n. as Glazov on the river Tchepsa. 4. The Volga Finns include the Cherremissian on the left bank of the Volga, from a little w. of Kasan to near Nijni-Novgorod; and the Nordivinian, divided into small communities on both banks of the Volga, about Simbirsk, Samara, Stavropot, and Tambar. 5. The Ugrian Finns include the Voguls, extending from the Ural mountains e. to near the river Obi, and s. to Tobolsk; the Ostyaks, from the Voguls e. to the river Yenissei, between Turuchausk and Yenisseisk, and from the Arctic circle to 59° n.; and the Magyars of Hungary. These five groups form one linguistic family, to which Samoyede is related. The richest and most highly cultivated languages of the family are the Suomi and Magyar. The dialects are all distinctly agglutinative forms of speech, with decided tendencies towards true inflection, so much so that in many grammatical endings the essential difference between agglutination and inflection becomes obscured. As in other Urato-Altaic tongues, progressive vowel-harmony forms a characteristic feature of the Finnish group. Rask considered the Finnish language the most sonorous and harmonious of tongues. It is maintained by some that the Finnish languages represent the oldest forms among the Urato-Altaic groups. There is strong evidence that the Finns, or a closely allied race, must have at one time, probably prehistoric, been spread over a considerable area of central, if not of western Europe. The Finnish language is spoken by over 2,000,000 people, and in three different dialects, viz., the East Finnish or Karelian, the South Finnish, and the West Finnish. The first of these is the oldest and least developed; the second is the main vehicle of Finnish literature. It is emphatically vocalic. It has five fundamental vowels—a, e, i, o, and u—and employs 12 diphthongs. The grammatical relations between the several parts of speech are expressed exclusively by suffixes. Nouns are used without any article; have no gender; and are declined, both in singular and plural, through 15 different cases, so as to express the relations which in the Indo-Germanic languages are sometimes indicated by prepositions. Verbs have but two tenses, present and past, the future tense being expressed by a circumlocution; but their conjugation is very intricate. The language is capable of expressing the nicest shades of meaning.

The chief monument of Finnish literature is the *Kalewala*, a sort of epic poem, which, until the present century, existed only in the memory and on the lips of the peasantry. A collection of some of the scattered parts of this poem was published in 1822 by Zacharias Topelius, but Elias Lönnrot, 13 years later, published a far more complete collection. Dr. Lönnrot wandered from place to place among the peasantry, living with them and taking down from their lips all that they knew of their popular songs. After unwearied diligence in his researches, he was successful in collecting 12,000 lines, which he arranged into 32 runes or cantos, and published exactly as he heard them sung or chanted. Continuing his researches, he published in 1849 a new edition of 22,793 verses, in 50 runes. The importance of this long-hidden epic was at once recognized in Europe, and translations of it were made in several languages. Some specimens of it were translated into English by prof. Porter, of Yale, and published in New York in 1868. The poem is written in eight-syllabled trochaic verse, and an idea of its style may be obtained from Longfellow's *Hiawatha*, which approaches a true imitation of the Finnish epic. Prof. Max Müller bears emphatic testimony to the merits of this ancient poem. "It is," he says, "equal to the *Iliad* in length and completeness; nay—if we can forget for a moment all that *we* in our youth learned to call

beautiful—not less beautiful. *Kalewala* will claim its place as the fifth national epic of the world, side by side with the Ionian songs, with the *Mahábhárta*, the *Shahnámeh*, and the *Nibelunge*." The *Kalewala* is concerned entirely with the mythology or folk-lore of the people. In the story there is a certain unity of plot, though the various parts are not perfectly homogeneous, and appear to be the product of different minds at different periods, the various songs having evidently received additions in course of time. They probably originated before the Finns were converted to Christianity, and when they were not scattered as they are now. When Dr. Lönnrot collected the *Kalewala* songs, he also gathered a considerable quantity of lyric poetry, which he published under the name of *Kanteletar*, from the name of the national instrument to which they are sung—a species of harp with five strings. Of recent Finnish poets, the most popular seems to be Paavo Korrhoinen, a peasant, a very sarcastic writer. Other modern poets are Marteska, Kettunen, Ilhainen, Oksaselta. The Finns abound in proverbs, Lönnrot having published a collection of upwards of 7,000, with about 200 charades, while considerable collections of legends and tales have been published. The first printed book in Finnish was probably the *Abecedarium* of Michael Agricola, bishop of Abo, which appeared in the middle of the 16th century. A translation of the New Testament by the same bishop appeared in 1548, at Stockholm. The whole Bible was not translated into Finnish till 1642. During the last and present centuries there has been considerable literary activity in Finland, and books in almost every branch of research are found in the language, mainly translations or adaptations. At the Paris international exhibition of 1878, several native Finnish painters and sculptors exhibited works which would do credit to any country. Finland is rich in periodicals of all kinds, the publications of the Finnish societies of literature and of the sciences and other learned bodies being specially valuable. Works on Finnish history and geography are quite numerous. In language we have Lönnrot's great Finnish-Swedish dictionary, recently published by the Finnish literary society.

FINNISH LITERATURE. To Elias Lönnrot of Helsingfors belongs the merit of having rescued from utter oblivion some of the numerous sagas and songs which had for ages been recited by the Finnish *runolainen*, or singers, to the sound of the *kantela*, or harp, and thus transmitted from one generation to another. Although his researches were limited to the district of Karelia, in the government of Kupio, he obtained numerous songs and proverbs, and a complete epos, consisting of 32 parts, each of which contained from 200 to 700 verses. This singular monument of the earlier culture of the people was published by him in 1835, under the title of *Kalewala* (the ancient name of Finland), but it met with little notice till the academy of Dorpat made it the subject of discussion at their meetings in 1840. This publicity soon attracted the attention of foreign philologists, and led to its translation into Russian, Swedish, and German. The learned Finnish scholar, Carsten, the Grimms, and Brockhaus, agree in regarding the *Kalewala* as a pure epic, and characterize it as a composition possessing a thoroughly oriental appreciation of nature, an almost unparalleled wealth of images and tropes, great flexibility of rhythm, and a copiousness of synonyms not to be met with in any other northern tongue. There is less unanimity in regard to the character of the plot, for while one critic believes that the incidents refer to definite historical epochs, another regards them as purely allegorical. But whatever discrepancy of opinion there may be in this respect, the *Kalewala* is admitted by all who are entitled to form a judgment of its merits, to be one of the most curious monuments of the kind possessed by any European people. The date of its composition must be referred to a period anterior to the introduction of Christianity amongst the Finns in the 14th c., while there is even strong internal evidence, from an identity of the names and traditions of the *Kalewala* with many still current in Esthonia, that the poems very probably belong to an epoch anterior to the immigrations of the Karelians into the districts which they now occupy. The publication of the *Kalewala* has given a powerful impetus to the study of the Finnish language, which the Russian government effectively sustains by encouraging the cultivation and use of their native tongue by the Finlanders. The upper classes still cling to the use of Swedish, but the peasantry and small landed proprietors welcome with avidity every addition to the limited stock of their printed literature. Finnish weekly papers circulate freely among them, and political questions are discussed with an enthusiasm which is never met with among similar classes in Scandinavia or Russia proper, but which affords additional proof of the diversity of character which distinguishes the Finn from either of the neighboring nations with which he has been successively incorporated.

The prose literature of Finland is almost exclusively devoted to religious and moral subjects. The Bible was translated into Finnish in 1642, but a part of the Old Testament had been translated a century earlier. Several Finnish poets have acquired a reputation of late years, but their works breathe the same melancholy tone which so strongly characterizes the more ancient poems of Finland. Lönnrot has made a collection of about 7,000 proverbs (*Suomen kansan Sanalskuja*, 1842), and about 2,000 charades (*Suom. kans. arwoituskia*, 1851). See Erman's *Archiv f. d. Kunde v. Russland. Tengström i Fosterländskt Alb.* (Helsingf.).

FINNS, geographically, the name of the inhabitants of Finland; but in ethnology, that of a considerable branch of the Ugrian race, dwelling for the most part in Finland,

though with some representatives in Sweden and Norway as well. The Ugrians have been classed among the nations said to have a Mongolian origin. Dr. Latham places them among the "Turanian Altaic Mongolidæ," and divides them into Ugrians of the east, and Ugrians of the west. The western Ugrians consist of Lapps, Finns, Permians, and other nations or tribes in the n. and n.w. of Russia, and of the Magyars in Hungary. The Magyars are the most numerous, and next after these come the F., comprising about 2,000,000 of individuals. All the other tribes of western Ugrians do not together comprise so many. The F., in common with the other Ugrians, are of the Mongolian type. A recent traveler, Mr. Bayard Taylor, describes them as having "high cheek-bones, square, strong jaws, full, yet firm lips, low broad foreheads, dark eyes and hair, and a deeper, warmer red on the cheeks than on those of the rosy Swedes. The average height is, perhaps, not quite equal to that of the latter race, but in physical vigor there is no inferiority, and there are among them many men of splendid stature, strength, and proportion.". Other travelers bear similar testimony to the physical appearance of the F. proper, or those of pure Finnish blood; but although these form the majority, there are many, in the towns especially, who pass for F., while, in reality, they are quite as much entitled to be called Swedes, or even Russians, on account of the frequent intermarriages of the F. with individuals of those two nations. The F., from having been originally a nomadic race, have for many centuries been stationary and civilized. Long before the arrival of the German and Slavic nations in the n. of Europe, the Ugrians, or *Ogres* (for the name so common in fiction is really of historic origin), possessed it, and were gradually pushed further n. and e. by the new invaders. Both F. and Lapps, there is good reason to believe, originally extended much further s. than they do at present, occupying, perhaps, the whole of Sweden and Norway. "The Finns," says Prichard, "were, in the time of Tacitus, as savage as the Lapps; but the former, during the succeeding ages, became so far civilized as to exchange a nomadic life for one of agricultural pursuits; while the Lapps have ever continued to be barbarous nomades, as well as the Siberian tribes of the same race—namely, the Woguls and Ostiaks. The Finns, as well as their brethren the Beormahs, or Finns of the White sea, had probably undergone this change long before the time when they were visited by Otther, the guest of Alfred. When the Finns were conquered by the Swedes, they had long been a settled people, but one of curious, and singular, and isolated character."

The Finnish *language*, like that of the other Ugrian nations, belongs to the Turanian family of languages, and hence offers some striking points of resemblance to the languages and dialects of the Turks, Tartars, Mongols, Mandshurians, Tungusians, and even Magyars or Hungarians. In Finnish, the nouns are not inflected, but an additional word is required to denote the variations of case, number, and sex. The prepositions and pronouns are suffixed to the words they modify. The verbs have only two tenses, past and present; the future being expressed by adding to the present some word indicating a future action or state of being. Rask considers the Finnish to be the most harmonious of tongues. Many Swedish, and a few Russian words have, of course, become incorporated with the language, in consequence of the social and political relations of the F. with those two countries. The F. of our time are doubtless the same race as the *Fenni* of Tacitus, and the *Phinnoi* of Strabo and Ptolemy, though not occupying the same geographical area. "The nearest approach to a name at once general and native," says Dr. Latham, "is Suomelainen, meaning swamp, morass, or fen people; the term Finn and Finlander being of foreign origin." With respect to the social habits, morals, and manners of the F., all travelers are unanimous in praising them. They are of a cheerful disposition, affectionate towards each other, and honest and honorable in their dealings with strangers. They are also cleanly in their persons, being much addicted to the use of the vapor-bath, to which circumstance may be attributed the strongly marked difference in physical appearance between them and the stunted Lapps, to whom, in language as well as many other respects, they stand closely related.

FINS (allied to Lat. *pinna* or *penna*, see letter F), organs adapted for swimming or locomotion in water. The limits of the application of the term are rather vague. It is always applied to the locomotive organs of fishes, when they possess special organs of locomotion, as almost all of them do; and equally to those organs (the pectoral and ventral fins) which are homologous to the limbs of other vertebrate animals, and to those (the vertical fins) which may be said to be superadded to them, and to belong to fishes alone; equally also to those which are furnished with rays, having a membrane stretched on them, as is generally the case in all the F. of fishes, and to those which consist, as in some fishes, of a mere fold of the skin, and which, when they exist in fishes, are in reality not very much organs of locomotion. The name F. is given to the locomotive organs of *cetacea*, but not to those of any other *mammalia*, even when, as in the case of the hind-feet of seals, they approach very nearly to the character of the F. of fishes. Nor is it ever given to the webbed feet of birds. But it is often given to the swimming organs of invertebrate animals, as to the expansions of the mantle which serve this purpose in the *cephalopoda*, and which are entirely destitute of rays.

FINSBURY, or FEN TOWN, a parliamentary borough of Middlesex, forming the n. part of London (q.v.).

FINSCALE. See RED-EYE.

FIN'STERAAR'HORN, the highest peak of the Bernese Alps. See ALPS.

FINSTERWALDE, a small t. of Prussia, in the province of Brandenburg, is situated on an affluent of the Black Elster, 40 m. n. of Dresden. It has manufactures of cloth and machinery; spinning and weaving are carried on. Pop. '75, 6,919.

FIOREL'LI, GIUSEPPE, b. 1823; an Italian archæologist, one of the directors, and more recently the chief superintendent, of the excavations at Pompeii. He has published maps of the old city, and a chronological history of the progress of discovery. He is also the editor of a journal containing a daily record of the work.

FIORENZUOLA (*Florentiola*), a t. of northern Italy, in the province of Piacenza, 22 m. w.n.w. from Parma, on the Arda, in a beautiful and fertile plain. It is a station on the railway between Parma and Piacenza, and is also on the ancient Æmilian way. It is well built, and a place of considerable activity. It formerly had numerous conventual and other ecclesiastical establishments. The principal church is still collegiate, and contains some curious relics of ancient art. There are some interesting relics of mediæval times in Fiorenzuola. It is supposed to occupy the site of the ancient *Fidentia*. Pop. 6,500.

FI'ORIN. See BENT GRASS.

FIR, a name often used in a sense coextensive with the widest sense of the word Pine (q.v.), and therefore so as to include a large portion of the Coniferæ (q.v.), or at least the whole of the Linnæan genus *pinus*. But the name F. is often also used in a more restricted signification, and the trees so designated are those forming the genus *abies* of some authors, *abies* and *picea* of others, which the greater number of botanists have now agreed in separating from *pinus*. The SCOTCH FIR, however, is a true pine (*pinus sylvestris*), and will be described along with its congeners. See PINE.—The genus *abies* is distinguished from *pinus* by the flat rounded apex of the scales of its cones, and by leaves not in clusters of definite number. Some botanists include the species of larch (q.v.) and cedar (q.v.) in the genus *abies;* but if these be separated, no species with clustered leaves remain in this genus, which then contains only the different kinds of SPRUCE FIR and of SILVER FIR, or species most nearly allied to those which ordinarily bear these names. All of them are evergreen. The spruce firs form the genus *abies* of some authors, distinguished by short solitary leaves, scattered all round the branchlets, and by the scales of the (pendulous) cones being attenuated at the apex, and remaining fixed to the axis of the cone. The silver firs form the genus *picea* of some, distinguished by the deciduous scales of the (erect) cones. It being supposed, however, that the Linnæan names had been given through mistake, and that the common silver fir is the true *abies* of the ancients, and the Norway spruce their *picea*, Link has attempted, but without being followed by many, to restore these names to their ancient use, and to denominate the genera accordingly. The NORWAY SPRUCE (*abies excelsa* or *pinus abies*) is a noble tree, sometimes attaining the height of 180 ft., with long cylindrical pendulous cones, denticulate scales, and scattered, green, crowded, suddenly pointed, almost quadrangular leaves. It is the *Fichte* of the Germans, called also *Rothtanne* or *Schwarztanne*. Like the other kinds both of spruce and silver fir, it exhibits the peculiar character of the *coniferæ* more perfectly than many of the true pines do, in its perfectly erect stem, from which proceed almost whorled horizontal branches. It is a very beautiful pyramidal tree, and when old, its long branches droop towards the ground. It forms entire forests in the middle and n. of Europe and in Asia, chiefly upon elevated ridges, although it prefers moist places. It loves districts of primitive rock. In some places, it is found even within the arctic circle. It is not a native of Britain, but has long been very generally planted, although too often it is merely made a nurse for other trees, and is not allowed to attain a considerable age or size. It is of rapid growth, but is believed to live to the age of 400 years. It yields the same products as the Scotch fir, resin, turpentine, tar, and lampblack (see these heads): but more resin than turpentine. The true spruce resin flows spontaneously from the bark. The purest pieces are whitish or pale yellow, are sold under the name of common FRANKINCENSE, and used for ointments and plasters, and when melted yield the common Burgundy pitch (q.v.). The bark of the spruce is a good and cheap non-conductor of heat; the cones are an excellent substitute for tanners' bark. In Sweden and Norway, the inner bark is made into baskets; and the long and slender roots, split and boiled with alkali and sea-salt, are dried, and twisted into cordage, which is used both for vessels and by farmers. The wood is used for fuel and for house-building; it also supplies masts and spars for ships. It is the WHITE CHRISTIANIA DEAL and DANZIG DEAL of the market, and is very largely imported into Britain from Norway and the Baltic. It is whiter, lighter, less resinous, and more elastic than the timber of Scotch fir. The sapwood, whilst still in a gelatinous state, is sweet, and is eaten fresh in Sweden and Lapland; and the inner bark, in times of scarcity, is mixed with a little flour or meal of some kind, and baked into bread. The young shoots, still covered with their bud-scales, are in many parts of Europe used for fumigation. The leaf-buds are also employed medicinally in cases of scurvy, rheumatism, and gout. The pollen is often sold by apothecaries instead of the dust of the clubmoss or *Lycopodium*.—A very superior

variety of this F. is known as the RED NORWAY SPRUCE. Dwarf varieties are cultivated amongst ornamental shrubs.—The BLACK SPRUCE (*Abies nigra*), of which the RED SPRUCE (sometimes called *A. rubra*) is regarded as a mere variety caused by difference of soil, and the WHITE SPRUCE (*A. alba*), form great woods in North America. The black spruce is found as far n. as lat. 65°. Both species are now common in plantations in Britain. Both have quadrangular leaves; those of the black spruce are of a dark glaucous green, those of the white spruce are of a lighter color. The cones of the black spruce are short, ovate-oblong, obtuse, and pendulous, with rounded scales ragged at the edge; those of the white spruce are oval, and tapering to a point with entire scales. The black spruce is a valuable timber tree, supplying yards of ships, etc., but its planks are apt to split. The white spruce is smaller, and the timber inferior. From the black spruce the *essence of spruce* is obtained, which is so useful as an antiscorbutic in long voyages, and is used for making spruce-beer. Spruce-beer is also made by adding molasses or maple sugar to a decoction of the young branchlets, and allowing the whole to ferment. From the fibres of the root of the white spruce, macerated in water, the Canadians prepare the thread with which they sew their birch-bark canoes; and the seams are made water-tight with its resin.—From the twigs of the ORIENTAL FIR (*A. Orientalis*), a native of the Levant, a very fine clear resin exudes, which is known by the name of SAPINDUS' TEARS. This F. has a very short quadrangular leaves, densely crowded, and uniformly imbricated.—The HEMLOCK SPRUCE of North America (*A. Canadensis*) forms great part of the forests of Canada and of the northern states of America, extending northwards as far as Hudson's bay. Its timber is not much esteemed, as it splits very obliquely, and decays rapidly in the atmosphere; but the bark is valued for tanning. The leaves are two-rowed, flat, and obtuse. The cones are scarcely longer than the leaves. The young trees have a very graceful appearance, but the older ones are generally much disfigured by remaining stumps of their lower branches.—*A. dumosa* of Nepal is very much allied to the hemlock spruce.—*A. Douglasii* is a noble tree, attaining a height of 250 ft., which forms immense forests in the n.w. of America, from lat. 43° to lat. 52°. The bark, when the tree is old, is rugged, and 6 to 9 in. thick. It abounds in a clear, yellow resin. The timber is heavy, firm, and valuable; the growth very rapid.—*A. Menziesii*, a native of North California, very similar to *A. Douglasii* in general appearance, also produces timber of excellent quality.—*A. brunoniana*, a Himalayan species, forms a stately blunt pyramid of 120 to 150 ft. in height, with branches spreading like the cedar, and drooping gracefully on all sides. It is found only at considerable elevations. The wood is not durable, but the bark is very useful.—The KHUTROW or HIMALAYAN SPRUCE (*A. Smithiana*, called also *A. morinda* and *A. khutrow*) much resembles the Norway spruce, but has longer and more pendulous branches. The wood is white, and not highly esteemed, although it readily splits into planks.—The MOUNT ENOS FIR (*A. Cephalonica*), a native of Cephalonia, attaining a height of 60 ft., and a diameter of three ft., yields durable and very valuable timber.—All these species have been introduced into Britain, and some of them seem likely soon to be pretty common in our plantations, as well as others from the n.w. of America and from the mountains of Asia, as *A. Wittmanniana*, etc., noble trees, and apparently quite suitable to the climate.—The common SILVER FIR (*Picea pectinata*, or *abies* or *pinus picea*) has erect cylindrical cones, 5 to 6 in. long, and two-rowed leaves, with two white lines upon the under side. It forms considerable woods upon the mountains of central Europe and of the n. of Asia, and attains a height of 150 to 180 ft., and an age of 300 years. It is not a native of Britain, but large trees are now to be seen in very many places. The wood is white, contains little resin, is very soft and light, and is employed for the ordinary purposes of coopers, turners, and joiners, and in ship and house carpentry, also for making band-boxes and for many fine purposes, especially for the sounding-boards of musical instruments. The same resinous and oily products are obtained from the silver F. as from the spruce and Scotch F. but of superior quality. It yields the beautiful clear turpentine known as Strasburg turpentine. Very similar to the silver F., but generally of much smaller size, and indeed seldom much above 30 ft. in height, is the BALM OF GILEAD FIR (*Picea* or *abies balsamea*), a native of North America from Virginia to Canada. The wood is of little value, but the tree yields Canada balsam (q.v.). Besides these, a number of other species of *picea* are found in the western parts of North America and in the Himalaya, some of which are trees of great magnitude, and yielding excellent timber, as *P. grandis*, a California tree of 170 to 200 ft. in height—*P. amabilis*, a species much resembling it—*P. nobilis*, a majestic tree, which forms vast forests on the mountains of northern California—*P. bracteata*, a Californian species remarkable for its slender stem, which rises to a height of 120 ft., and yet is only about one foot in diameter at the base, and likewise for the manner in which the middle lobe of each bractea of its cones is produced so as to resemble a leaf—*P. Webbiana*, the HIMALAYAN SILVER FIR, which in its native regions, fills the upper parts of mountain valleys, and crowns summits and ridges at an elevation of upwards of 10,000 ft., a tree of great size, 35 ft. in girth, and with a trunk rising 40 ft. before it sends out a branch. Most of these have been introduced into Britain with good prospect of their succeeding well in our climate, and other species, as *P. pichta*, a native of the Altai mountains, very nearly resembling the silver F., *P. nordmanniana*, *P. Fraserii*, etc.—*P. religiosa* is a tall and elegant tree, a native of the mountains of Mexico, with

slender branches, which are very much used by the Mexicans for adorning churches, and cones shorter than those of any other silver fir. *P. jezoensis* is a new species introduced from Japan.

FIRBOLGS, the name given in the fabulous early history of Ireland to a tribe said to have descended from the Nemedians, who, under their leader Nemedius, landed in the island about 2260 B.C.; and after 217 years, left it, on account of the oppression to which they were subjected by pirates called the Fomorians. The emigrating Nemedians formed three bands—one went to Thrace, and from them descended the F.; a second to the n. of Europe or Lochlan, from whom descended the Tuatha de Danann; and the third to Alban or Scotland, from whom sprung the Britons. The F. returned to Ireland in three tribes, one of which more especially bore the name Firbolg; the others were called Firdomnan, and Firgailian. The three tribes, however, were under five leaders, by whom Ireland was divided into five provinces. With Slainge, the first Firbolg king, who began to reign 1934 B.C., and reigned only one year, the Irish historians begin their account of the Irish monarchy and list of kings. The F. were driven out, after they had been thirty-six years in Ireland, by their kinsmen, the Tuatha de Danann, from Scotland, they having previously passed over to that country from Lochlan; and these, in their turn, were expelled or conquered by the Milesians. The most recent investigators of the early history of Ireland regard the story of the F. as having some basis of truth, but no chronological accuracy; the different tribes having long subsisted in the country together, and with varying fortunes as to temporary superiority. See IRELAND.

FIRDUSI, FIRDOWSI (TUSI), ABU'L-KASIM MANSUR, the greatest epic poet of Persia, was b. between 304–328 H., or 916–940 A.D., at Shadab or Rizvan, near Tus in Khorassan. Whether the name F. (from *firdus*, garden, paradise) was given to him because his father (Fachreddin Ahmad) was a gardener, or on account of the "paradise of poetry" which he had created, is matter of controversy. All that is known of his early life is, that when a boy he was very industrious, and also that "he loved to sit for days alone on the bank of a river." At the age of between thirty and forty, he went to Gazneh, where Mahmud de Gaznewide, a great admirer and patron of poetry and the arts generally, then resided. Erelong, F. had an opportunity of displaying both his talent and his extraordinary knowledge of ancient Persian history and legendary lore before the sultan himself, who was so pleased with an episode (the story of Sijavush) written by him at his majesty's order, that he at once paid him a gold dirhem for each couplet, and shortly afterwards sent him a great number of fragmentary ancient chronicles and histories of Persia, that he might versify them, and thus carry out the task once attempted by Dakiki—viz., to write a poetical history of the Persian kings from the creation of the world to the end of the Sassanide dynasty (636 A.D.)—the reward to be a dirhem a line. F. spent thirty years over the work, and produced the famous *Book of Kings* (*Shah Nameh*), consisting of 60,000 double lines. Without going so far as many critics have gone, we may fairly rank it among the greatest epics of all nations: the *Iliad*, the *Mahábhárata*, the *Nibelungen*. Truth and fiction, history and fairy lore, all the most gorgeous imagery of the east and its quaintest conceits, together with the homeliest and most touching descriptions of human joy and human sorrow, of valor and of love, the poet has formed into one glowing song. Though abounding—in strict adherence to its sources—in impossibilities and anachronisms (such as Alexander the great being a Christian, Ki-Khosroo holding the Zend Avesta in his hands—some hundred and twenty years before it was brought to light—Abraham being Zerdusht, etc.), it yet contains not a little that is of real historical value, quite apart from its being the most faithful mirror of its own times. See SHAH NAMEH. But while F. was "weaving his poetical carpet," his enemies had not been idle. Unable to attack his genius and his honesty, they attacked his religious opinions; and the sultan, influenced by bigotry and avarice, sent the poet, instead of 60,000 dirhems of gold, so many dirhems of silver. F. was at a public bath when the messenger arrived with the money, and on discovering that it was silver, and not gold, Mahmud had sent him, he divided the amount into three portions, and gave one to the attendant at the bath, another to the messenger, and the third to a man who brought him a glass of sherbet. He then burned several thousand verses which he had written in praise of the sultan, as sequel to the *Shah Nameh*, and composed one of the bitterest satires against him, which he handed over, well sealed, to the king's favorite slave, to give it to him when he might be seized with one of his fits of despondency, as it contained a beautiful panegyric on him. Dreading the sultan's rage, he fled precipitately, first to Tus; persecuted here, he next went to Bagdad, where Kadir Billah, the caliph, received him with all honor. But the unrelenting anger of Mahmud followed him thither, and he removed to Tabaristan, which again he had to leave, to seek another place of refuge. After eleven years of restless wanderings, he was at last allowed to return to his native place, a broken, wretched old man. Mahmud is said to have repented his cruelty at last, and to have sent a caravan loaded with the costliest goods to F., to entreat his forgiveness, and induce him to become once more the star of his court. But while the king's messengers entered one gate of the city, F.'s bier was carried out to his last abode by the other, 1020 A.D. (411 H.). His only daughter—an only son of his had died long before him at the age of 37 years—

refused the sultan's present, and certain buildings were erected instead, in honor of the dead poet.

The great popularity which the *Shah Nameh* has always enjoyed in the east, is to a certain amount also the cause of the uncritical state of the texts. Every transcriber shaped and molded certain passages, or even episodes, according to his own fancy, so that not two out of the innumerable copies are quite alike. Nor are the 60,000 couplets extant in any one instance, the utmost number, including all the most palpable interpolations, never exceeding 56,600. The first complete edition of the text, with a glossary and introduction, was published by Turner Macan (Calcutta, 1829, 4 vols.). Another edition, with a French translation, was published by Mohl (Paris, 1840, etc.). Champion published some English extracts in 1788. F. also wrote another poem, *Yusuf and Zuleikha*, which has been edited by Morley, and a *Divan*, or collection of poems. Many European orientalists have written on F.; among others, Hammer, Wahl, Görres, Schack, Rückert, Morley, Ouseley, Atkinson, Nasarianz, etc.

FIRE. For the superstitions connected with fire. See BELTEIN, NEED-FIRE, and SUN AND FIRE WORSHIP.

FIRE. Whether a tribe of men ignorant of fire and its uses has ever existed, is a question in dispute among historians and travelers. It will be enough to say that absolute proof of the existence of such a tribe has not been presented, though there are many well authenticated facts and circumstances that suggest its possibility. The uses and dangers of fire, and to a certain extent the means of controlling it, must have been generally understood at a very early age. At first it may have been simply an object of terror, but probably men soon discovered that it was a friend no less than an enemy. Concussion or friction was undoubtedly the earliest method employed for producing fire. In the process of chipping stone, sparks were elicited, which, falling upon combustible substances, may have taught men how to produce a blaze at pleasure. The concussion of flint and steel was for ages doubtless the common method of kindling a fire, and it has not yet been entirely superseded. The Alaskans strike together two pieces of quartz, rubbed with sulphur, thereby setting the sulphur on fire, and then transfer the flame to a heap of dry grass. The Esquimaux use quartz and iron pyrites. In some countries sparks are produced by striking a piece of broken china upon bamboo; in Cochin China two pieces of bamboo are used, the silicious character of the outside layer of this wood rendering it as good as native flint. Numerous mechanical devices, for increasing by rapidity of motion the friction of different woods, were resorted to. In some cases a stick was rubbed backwards and forwards; in others it was made to rotate rapidly in a round hole in a stationary piece of wood. This method was used by the North American Indians, who improved it by applying the principle of the bow-drill. The Iroquois used the still more ingenious pump-drill. The production of fire by concentrating the rays of the sun by means of a burning-glass was well known to the ancients. North American legends narrate how the great buffalo, careering through the plains, makes sparks flit in the night, and sets the prairie ablaze by his hoofs hitting the rocks. The same idea appears in the Hindu mythology. To save the labor required in these initial processes of procuring light, and to avoid the inconvenience of carrying it about continually, primitive men hit on the expedient of a fire which should burn night and day in a public building. The Egyptians had one in every temple, the Greeks, Latins, and Persians in all towns and villages. Of these the "eternal lamps" in the Byzantine and Catholic churches may be the survival. Even the functions of the state itself, according to some eminent writers, appear to have grown out of the care bestowed on the tribal fire. The first guardians of this fire, it is said, were the earliest public servants, who by degrees appropriated all important offices, as the state itself developed into a vast aggregation of interests. The men who in the Roman empire took charge of the tribal fire were called the prytanes. They were fed at the public expense, and they became magistrates, in whom were combined the powers of captain, priest, and king. When Augustus usurped the authority of imperator, he assumed the powers which belonged to a board of flamens, or of prytanes. He made himself pontifex maximus and assumed the charge of the public fire. The Hellenic nations, as well as the Aztecs, received their ambassadors in their temples of fire, where, as at the national hearth, they feasted the foreign guests. The prytaneion and the state were convertible terms. If by chance the fire in the Roman temple of Vesta was extinguished, all tribunals, all public or private business had to stop immediately. No Greek or Roman army crossed the frontier without carrying an altar where the fire taken from the prytaneion burned night and day. Greek colonies went not forth without living coals from the altar of Hestia, to light in their new country a fire like that burning at the old home. Architecture, it is supposed, began with the creation of sacred sheds to protect the sacred fire, which was looked upon as a divinity. The fire that burned in the temple of Vesta was regarded as the very goddess herself. The hearth fire was kept holy, its flame was to remain bright and pure. According to the Zend Avesta nothing unclean was to be thrown into the fire, and no indecent actions are to be committed before it. To spit in one's fire would be considered in some places an unpardonable offense. Some people were so reverent that they would not blow out a light lest they should render the flame impure with their breath. In the course of time, the same

reasons which led to the provision for a tribal fire induced every family to have its hearth. The family developed itself only after the married pair and their offspring had their own fire-place. This family fire was at first the privilege of only the aristocracy. The hearth was the very center of the house, as the regia was the sacred center of Rome and the Roman commonwealth; around the regia the civic and politic institutions developed themselves; and around the hearth the family grew slowly into shape and power. Let us hope it may not decline under the influence of those "modern improvements" which have superseded the hearth-stone and banished from sight the household fire. The Gentile hearth gave a recognized asylum—a right still in full vigor in some countries. The proud saying of the Englishman that his home is his castle is a remnant of this old feeling. According to the ancient belief the soul and the fire were identical. As the sun gave life to the earth, so the fire on the hearth radiated life within the house. It was the seat of the Lares and Penates, of the ancestors; a dwelling-place for the deceased; there also a stock of souls ready to enter into existence by new births was maintained. The Vedas taught that the hearth-fire was co-substantial with the cause of generation. Hence care was taken to preserve the purity of descent in the kin by preserving the flame of the hearth pure and unmingled with the fire taken from another house. The ancient Persians fed their fires, and especially their sacred fires, with only certain kinds of wood reputed to be cleaner than others, well dried and stripped of the bark. In all countries it was considered a fatal omen if the fire died out on the hearth. A new fire was to be lighted by the friction of two twigs, as to fetch some from a neighbor's would have been considered an adulterous union of hearths, an undue mingling of the blood of two families. The ancient naturalists supposed that the generation of fire by the friction of two woods, one of harder, the other of softer substance, was the exact counterpart of human generation. Life was compared to a flame, to a torch, and no comparison can be more true. A torch that was put out by throwing it violently on the ground symbolized in ecclesiastical rites excommunication, or the condemnation of a soul to eternal death. Sickness being identified with sin, fire became the first and most esteemed of curative agents. The mother, after delivery, walked through fires lighted on her right hand and on her left; the infants, especially the males, were fumigated with great care. Among some populations none could approach mother and child without stepping over a brazier. Fiery ordeals heralded the attainment of the age of puberty by both sexes. Purification by fire led to the institution of baptism by fire, which in many places was thought vastly superior to baptism by water; and the idea obtained its furthest development in the notion of purgatorial fires.

Not to dwell longer on the symbolic and superstitious uses of fire, we pass to a consideration of it in its relations to the destruction by it of life and property. History is full of accounts of its ravages in all parts of the civilized world. The following list embraces the more memorable of the great fires of which records have been preserved:

Great Britain and Ireland.

798. London; nearly destroyed.
982. " greater part of the city burned.
1086. " all houses and churches from the east to the west gate burned.
1212. " greater part of the city burned.
1666. " "The great fire," Sept. 2 to 6. It began in a wooden house in Pudding lane, and burned for three days, consuming the buildings on 436 acres, 400 streets, lanes, etc., 13,200 houses, with St. Paul's church, 86 parish churches, 6 chapels, the guildhall, the royal exchange, the custom-house, many hospitals and libraries, 52 companies' halls, and a vast number of other stately edifices, together with 3 of the city gates, 4 stone bridges, and the prisons of Newgate, the Fleet, and the Poultry and Wood street compters. The fire swept from the Tower to the Temple church, and from the n.e. gate to Holborn bridge. Six persons were killed. The total loss of property was estimated at the time to be $53,652,500.
1794. " 630 houses destroyed at Wapping. Loss above $5,000,000.
1834. " houses of parliament burned.
1861. " Tooley street wharves, etc., burned. Loss estimated at $10,000,000.
1873. " Alexandra palace destroyed.
1137. York; totally destroyed.
1184. Glastonbury; town and abbey burned.
1507. Norwich; nearly destroyed; 718 houses burned.
1612. Tiverton; 600 houses burned. Loss, $1,000,000.
1700. Edinburgh; "the great fire."
1612. Cork; greater part burned, and again in 1622.
1613. Dorchester; nearly destroyed. Loss, $1,000,000.
1614. Stratford-on-Avon; burned.
1760. Portsmouth; dock-yard burned. Loss, $2,000,000.
1802. Liverpool; loss, $5,000,000.
1875. Glasgow; loss, $1,500,000.

France.

1118. Nantes; greater part of the city destroyed.
1137. Dijon; burned.
1524. Troyes; nearly destroyed.
1720. Rennes; on fire from Dec. 22 to 29; 850 houses burned.
1784. Brest; fire and explosion in dock-yard. Loss, $5,000,000.
1871. Paris; communist devastations. Property destroyed, $160,000,000.

Central and Southern Europe.

64. Rome; burned during 8 days; 10 of the 14 wards of the city were destroyed.
1106. Venice; greater part of the city was burned.
1577. " fire at the arsenal; greater part of the city ruined by an explosion.
1405. Bern was destroyed.
1457. Dort; cathedral and large part of the town burned.
1491. Dresden was destroyed.
1764. Königsberg; public buildings, etc., burned. Loss, $3,000,000.
1769. " almost destroyed.
1784. Rokitzan (Bohemia) was totally destroyed. Loss, $1,500,000.
1801. Brody; 1500 houses destroyed.
1859. " 1000 houses destroyed.
1803. Posen; large part of older portion of city burned.
1818. Salzburg was partly destroyed.
1842. Hamburg; a fire raged for 100 hours, May 5 to 7. During the fire the city was in a state of anarchy. 4,219 buildings, including 2,000 dwellings, were destroyed. One fifth of the population was made homeless, and 100 persons lost their lives. The total loss amounted to $35,000,000. After the fire, contributions from all Germany came in to help rebuild the city.
1861. Glarus (Switzerland); 500 houses burned.

Northern Europe.

1702. Bergen; greater part of the town destroyed.
1728. Copenhagen; nearly destroyed; 1650 houses burned, 77 streets.
1794. " royal palace with contents burned.
1795. " 50 streets, 1563 houses.
1751. Stockholm; 1000 houses destroyed.
1759. " 250 houses burned. Loss, $2,420,000.
1775. Abo; 200 houses and 15 mills burned.
1827. " 780 houses burned, with the university.
1790. Carlscrona; 1087 houses, churches, warehouses, etc., destroyed.
1858. Christiania; loss estimated at $1,250,000.
1865. Carlstadt (Sweden); everything burned except the bishop's residence, hospital, and jail. Ten lives lost.

Russia.

1736. St. Petersburg; 2,000 houses burned.
1862. " great fire. Loss, $5,000,000.
1752. Moscow; 18,000 houses burned.
1812. " the Russians fired the city on Sept. 14, to drive out the army of Napoleon. The fire continued five days. Nine tenths of the city was destroyed. Number of houses burned, 30,800. Loss, $150,000,000.
1753. Archangel; 900 houses burned.
1793. " 3,000 buildings and the cathedral burned.
1786. Tobolsk; nearly destroyed.
1848. Orel; large part of the town destroyed.
1850. Cracow; large part of the town burned.
1864. Novgorod; large amount of property destroyed.

Turkey.

The following fires have occurred at Constantinople:

1729. A great fire destroyed 12,000 houses and 7,000 people.
1745. A fire lasted five days.
1750. In Jan., 10,000 houses burned; in April, property was destroyed estimated from $5,000,000 to $15,000,000. Later in the year, 10,000 houses were destroyed.
1751. 4,000 houses were burned.
1756. 15,000 houses and 100 people destroyed. During the years 1761, 1765, and 1767, great havoc was made by fire.
1769. July 17. A fire raged for twelve hours, extending nearly 1 m. in length. Many of the palaces, some small mosques, and nearly 650 houses were destroy ed.
1771. A fire lasting 15 hours consumed 2,500 houses and shops.
1778. 2,000 houses were burned.

1782. Aug. 12. A fire burned three days: 10,000 houses, 50 mosques, and 100 corn-mills destroyed; 100 lives lost. In Feb., 600 houses burned; in June, 7,000 more.
1784. Aug. 5. A fire burned for 26 hours, and destroyed 10,000 houses, most of which had been rebuilt since 1782. In the same year, Mar. 13, a fire in the suburb of Pera destroyed two thirds of that quarter. Loss estimated at 2,000,000 florins.
1791. Between March and July, 32,000 houses are said to have been burned, and as many in 1795.
1799. In the suburb of Pera 13,000 houses were burned, and many magnificent buildings.
1816. Aug. 16. 12,000 houses and 3,000 shops in the finest quarter were destroyed.
1818. Aug. 13. A fire destroyed several thousand houses.
1826. A fire destroyed 6,000 houses.
1848. 500 houses and 2,000 shops destroyed. Loss estimated at $15,000,000.
1865. A great fire destroyed 2,800 houses, public buildings, etc. Over 22,000 persons were left homeless.
1870. June 5. The suburb of Pera, occupied by the foreign population and native Christians, was swept by a fire which destroyed over 7,000 buildings, many of them among the best in the city, including the residences of the foreign legations. Loss estimated at nearly $25,000,000.

1797. Scutari; the town of 3,000 houses totally destroyed.
1763. Smyrna; 2,600 houses consumed. Loss, $1,000,000.
1772. " 3,000 dwellings burned; 3,000 to 4,000 shops, etc., consumed. Loss, $20,000,000.
1796. " 4,000 shops, mosques, magazines, etc., burned.
1841. " 12,000 houses were burned.

India.

1631. Rajmahal; palace and great part of the town burned.
1799. Manilla; vast store-houses were burned.
1833. " 10,000 huts were burned, Mar. 26; 30,000 people rendered homeless and 50 lives lost.
1803. Madras; more than 1000 houses burned.
1803. Bombay; loss by fire of $3,000,000.

China and Japan.

1822. Canton was nearly destroyed by fire.
1866. Yokohama; two thirds of the native town and one sixth of the foreign settlement destroyed.
1872. Yeddo; a fire occurred in April during a gale of wind, destroying buildings covering a space of 6 sq. m.; 20,000 persons were made homeless.
1873. Yeddo; a fire destroyed 10,000 houses.

United States.

1679. Boston; all the warehouses, 80 dwellings, and the vessels in the dock-yards were consumed. Loss, $1,000,000.
1760. " a fire caused a loss estimated at $500,000.
1872. " great fire, Nov. 9 and 10. By this fire the richest quarter of Boston was destroyed. The fire commenced at the corner of Summer and Kingston streets. The area burned over was 65 acres; 776 buildings, comprising the largest granite and brick warehouses of the city, filled with merchandise, were burned. The loss was about $75,000,000. Before the end of the year 1876, the burned district had been rebuilt more substantially than before.
1778. Charleston; a fire caused the loss of $500,000.
1838. " one half of the city was burned, April 27; 1158 buildings destroyed. Loss, $3,000,000.
1820. Savannah; 463 buildings were burned. Loss, $4,000,000.
1776. New York; Sept. 21 (six days after the British took possession of the city), all the w. side, from Broadway to the North river, was burned.
1811. " about 100 houses burned on Chatham street.
1835. " the great fire of New York began in Merchant street, Dec. 16, and burned 530 buildings in the business part of the city; 1000 mercantile firms lost their places of business. The area burned over was 52 acres. The loss was $15,000,000.
1845. " a fire in the business part of the city, July 20, destroyed 300 buildings. The loss was $7,500,000. 35 persons were killed.
18[illegible] Pittsburg; a large part of the city burned, April 11; 20 squares, 1100 buildings destroyed. Loss, $10,000,000.

1877. Pittsburg; riot of railway workmen. Loss over $3,260,000. These claims were compromised at $1,600,000. Of railroad rolling stock there were wholly destroyed and partially damaged 107 locomotives. There were wholly destroyed 33 passenger coaches, 5 Pullman palace coaches, 3 officers' coaches, 7 emigrant coaches, 3 combined baggage and passenger coaches, 1 paymaster's car, 8 baggage cars, 10 express cars, 2 postal cars, 951 box or house cars, 92 refrigerator cars, 34 stock cars, 856 gondola or flat cars, 48 cabin or freight conductors' cars, 1 tool car, 98 coal and coke cars.
1846. Nantucket was almost destroyed.
1848. Albany; 600 houses burned, Aug. 17. Area burned over, 37 acres, one third of the city. Loss, $3,000,000.
1849. St. Louis; 23 steamboats at the wharves, and the whole or part of 15 blocks of the city burned, May 17. Loss, $3,000,000.
1851. " more than three quarters of the city was burned, May 4; 2,500 buildings. Loss, $11,000,000.
1851. " 500 buildings burned. Loss, $3,000,000.
1850. Philadelphia; 400 buildings burned, July 9; 30 lives lost. Loss, $1,000,000.
1851. San Francisco; on May 4 and 5, a fire destroyed 2,500 buildings. A number of lives lost. More than three fourths of the city destroyed. Loss upwards of $10,000,000. In June another fire burned 500 buildings. Loss estimated at $3,000,000.
1866. Chicago; two fires, on Aug. 10 and Nov. 18. Loss, $500,000 each.
1871. " the greatest fire of modern times. It began on the night of the 8th of Oct., and raged until the 10th. The area burned over was 2,124 acres, or 3¼ sq. m., of the heart of the city; 250 lives were lost, 98,500 persons were made homeless, and 17,430 buildings were consumed. The buildings were one third in number and one half in value of the buildings of the city. Before the end of 1875, the whole burned district had been rebuilt. The loss was estimated at $195,000,000.
1862. Troy (N. Y.) was nearly destroyed by fire.
1866. Portland; great fire on July 4. One half of the city was burned; 200 acres were ravaged; 50 buildings were blown up to stop the progress of the fire. Loss, $10,000,000 to $11,250,000.
1871. October; large forest fires in Wisconsin and Michigan; 15,000 persons were made homeless; 1000 lives lost. Loss estimated at $3,000,000.

British North America.

1815. Quebec was injured to the extent of $1,300,000.
1845. " 1650 houses were burned, May 28. One third of the population made homeless. Loss from $2,000,000 to $3,750,000. Another fire, on June 28, consumed 1300 dwellings; 6,000 persons were made homeless; 30 streets destroyed. Insurance losses, $303,850.
1866. " 2,500 houses and 17 churches in French quarter burned.
1825. New Brunswick; a tract of 4,000,000 acres, more than 100 m. in length, was burned over; it included many towns; 160 persons killed, and 875 head of cattle; 590 buildings burned. Loss about $300,000. Towns of Newcastle, Chatham, and Douglastown destroyed.
1837. St. John (New Brunswick); 115 houses burned, Jan. 13, and nearly all the business part of the city. Loss, $5,000,000.
1877. " great fire on June 21. The area burned over was 200 acres; 37 streets and squares totally or in part destroyed; 10 m. of streets; 1650 dwellings; 18 lives lost. Total loss, $12,500,000. Two fifths of the city destroyed.
1846. St. John's (Newfoundland); nearly destroyed, June 9. Two whole streets burned, upwards of 1 m. long. Loss estimated at $5,000,000.
1850. Montreal; a fire destroyed the finest part of the city on June 7; 200 houses were burned.
1852. " a fire, July 9, rendered 10,000 people destitute. The space burned was one mile in length by half a mile in width, including 1200 houses. Loss, $5,000,000.

South America.

1536. Cuzco was nearly consumed.
1861. Mendoza; a great fire followed an earthquake which had destroyed 10,000 people.
1862. Valparaiso was devastated by fire.
1863. Santiago; fire in the Jesuit church; 2,000 persons, mostly women and children, perished.

West Indies.

1752. Pierre (Martinique) had 700 houses burned.
1782. Kingston (Jamaica) had 80 houses burned. Loss, $2,500,000.

1795. Montego Bay (Jamaica); loss, $2,000,000.
1805. St. Thomas; 900 warehouses consumed. Loss, $30,000,000.
1808. Spanish Town (Trinidad) was totally destroyed. Loss estimated at $7,500,000.
1828. Havana lost 350 houses; 2,000 persons reduced to poverty.
1843. Port Republican (Hayti); nearly one third of the town was burned.

The causes of the conflagrations above recorded, and the reasons why many of them were so extensive, are not far to seek. Wooden buildings crowded together upon narrow streets and filled with combustible materials, radical faults of construction, an insufficient supply of water, the lack of proper engines and other appliances, and the want of organization, are sufficient to account for such calamities. When, however, a conflagration has passed certain limits, there appear to be no agencies of human forethought or application which can control it. The Chicago fire, driven by a gale which was almost a hurricane, raged for a day through wide streets, consuming buildings of the best material, erected with the greatest care, in the most substantial manner. The wind carried great masses of burning brands skirmishing far in advance of the grand army of destruction, and constantly starting new fires, which the combined fire-brigades of the chief cities of the land could not have prevented or extinguished. It should be remembered, moreover, that these and other similar tables record only a small proportion of the losses by fire. The great conflagrations make a strong impression upon the public, while no record whatever is made of the vast number of smaller fires which in the aggregate are still more destructive. The value of the insured property destroyed annually by fire in the whole world has been estimated at from one hundred and twenty to two hundred millions of dollars. If we add to this the losses from the destruction of property uninsured, the figures will be startling indeed. The property slowly accumulated by the labor of thousands and tens of thousands of men may, for want of care, perish in a night, and the loss to the community would in no way be alleviated if the whole were insured. The question how fires may be most effectually prevented, and, when they occur, how they may be most surely and rapidly extinguished, is of the highest importance to mankind; and some light may be thrown upon the subject by considering the actual causes or occasions of fires, so far as they are known. The following abstract of the results deduced from about 30,000 fires occurring in London within a period of 33 years (1833–65), is of general interest. The percentages of causes were: candles, 11.07; children playing, 1.59; defective flues, 7.80; friction matches, 1.41; smoking tobacco, 1.40; sparks of fire, 4.47; spontaneous ignition, 0.95; stoves, 1.67; other known causes, 19.40; unknown causes, 32.88. Incendiarism would doubtless be found upon inquiry to account for a large proportion of the fires whose causes are here marked "unknown."

The following statistics of fires occurring in the city of New York in 1876–79 are taken from the reports of the fire department:

FIRES IN THE CITY OF NEW YORK.

Years.	No.	Loss.	Insurance.	Uninsured loss.	Expenditure for Fire Department.
1876	1,382	$3,851,213	$12,667,009	$82,138	$1,243,386 89
1877	1,450	3,210,695	12,508,627	122,685	1,223,391 95
1878	1,655	1,883,052	14,341,072	142,702	1,240,920 26
1879	1,551	5,671,580	21,801,710	180,060	1,219,021 34
Total	6,038	$14,616,540	$61,318,418	$527,585	$4,926,720 44

CAUSES OF FIRES IN THE CITY OF NEW YORK.

Years.	Carelessness.	Children playing with matches and fire.	Defective flues, etc.	Escaped gas.	Fat, oil, taking fire.	Foul chimneys.	Heat from grates, etc.	Incendiary.	Kerosene lamps.	Not ascertained.	Overheated stoves, etc.	Sparks from chimneys, etc.	Spontaneous combustion.	Window curtains, etc., from gas-lights.	Other causes.	Total.
1876	371	77	44	26	20	144	24	19	94	94	45	79	25	60	260	1,382
1877	414	83	42	33	24	164	42	12	136	62	45	82	35	96	180	1,450
1878	412	112	46	26	26	191	26	28	152	131	65	127	44	87	182	1,655
1879	378	100	50	32	43	187	76	16	93	99	58	116	40	79	184	1,551
Totals	1,575	372	182	117	113	686	168	75	475	386	213	404	144	322	806	6,038
Per cent.	26.1	6.1	3.0	1.9	1.9	11.4	2.8	1.2	7.9	6.4	3.5	6.7	2.2	5.3	13.3	

The study of this table will show in what a vast proportion of cases fires are the result of preventable causes—in other words, of carelessness that ought to be avoided. The general diffusion of information such as this would no doubt diminish in some degree the number of fires, while the use of incombustible building materials would have a still more powerful effect. But so long as the present modes of building prevail, the main dependence for preventing or diminishing losses by fire must be upon efficient organization and the use of the best means and appliances for the sure and quick extinguishment of fires when once they have been kindled. In this respect there have been great improvements in the last few years, and doubtless others will be made in the future. By means of the electric fire-alarm the knowledge of the existence of a fire and of its precise location is diffused with a rapidity formerly unknown. The fire departments in our large cities and towns are so organized as to respond instantly to an alarm. Engines worked by steam-power are ready to move at once, and they are conveyed to the desired spot by horses trained to move swiftly and with almost human intelligence. The firemen are systematically and thoroughly trained, and led by men selected for their experience, energy, and courage. The best appliances that science can suggest are ever at command; above all, the supply of water is abundant. The firemen seek first to extinguish the fire and save the building in which it broke out; if that be found impossible, they direct their efforts towards its circumscription or limitation. When a building is filled with flame there is no use in trying to save it; the thing to be done is to prevent the fire from spreading to other buildings. The use of gunpowder and other means of breaking connection with neighboring buildings is sometimes necessary.

The New York fire department is thoroughly organized. A military spirit pervades all its regulations and movements. It is under the direction of a board of three commissioners, appointed by the mayor. The active force, divided into battalions and subdivided into companies—in all about 800 men—is under the command of a chief of department, supported by an assistant and chiefs of battalion. Each engine and ladder company is provided with a house of its own where the men live and their horses and apparatus are kept. The whole force is required to be constantly on duty and in the houses, except such of the number as are on street parole or at their meals. The horses are kept in stalls facing the engine, and are loosened by an automatic electric arrangement upon the instant that an alarm is struck. The moment they hear the sound of the gong they advance without further order to their places at the pole of the engine, the harness drops at a touch from its place of suspension and is fastened upon them in a second, the men leap to their places, and the carriage is driven at high speed to its destination. The engine is at all times kept supplied with water at a boiling point from stationary engines, and a fire is lighted under the boiler the instant it leaves the house, so that when it reaches the scene of danger a full pressure of steam is provided. So quickly is all this done, that in from three to five minutes after an alarm, streams of water are usually in full play upon the fire. The city is divided into battalion districts of small area, and the signal boxes of the fire-alarm telegraph are so placed as to afford the means of giving an alarm the moment a fire is discovered. The first alarm, calls out only a small force in the neighborhood where it is needed, if additional force is required, other alarms are given. The firemen are carefully trained, and acquire a high degree of skill in the performance of their duties. In ordinary circumstances they are able to extinguish a fire before it can do much damage; it is only when it has gained great headway before discovery, or when there are obstructions preventing ready access thereto, or when the supply of water fails, that they are unable to get it under quick control. See FIRE-ENGINE. [From *Ency. Brit.*, 9th ed.]

FIRE, in armorial bearings, is used to denote those who, being ambitious of honor, perform brave actions with an ardent courage, their thoughts always aspiring as the fire tends upwards. A flame of fire is more frequently used as a charge in France and Germany than in this country; but we have fire-balls or bombs, fire-beacons, firebrands, fire-buckets, etc., in abundance.

FIRE, ORDEAL BY. See ORDEAL.

FIRE, ST. ANTEONY'S. See ERYSIPELAS.

FIRE-ALARM, apparatus, mechanical, electric, and telegraphic, used for detecting fires, or for warning the fire department that fires exist. A series of signal-boxes is distributed over a given area, each box having a distinctive number, and being connected with the central station and with alarm-bells in the several engine-houses. A signal-box contains a transmitter, consisting of a metallic wheel, provided with suitably arranged teeth; the spaces between the teeth are filled with some non-conducting substance, as ivory; a contact spring rests against the wheel, and, as the wheel is turned, touches in succession the projecting teeth, at each tooth making the circuit, and causing a signal at all receiving stations. If the arrangement should be, two teeth, a space, three teeth, a space, and two teeth, followed by a long space, one rotation of the wheel would give two signals, then three, then two, or the number 232, and this number will be repeated as often as the wheel is rotated. The wheel may be turned by a crank, or by a spring, acting so long as a detent is held away. The signal is received upon the common Morse instrument, and recorded on a strip of paper.

The automatic fire-detecter is a thermometer which has a platinum wire sealed into its bulb, and a second wire inserted at the mark of a certain temperature on the scale. The wires are in a telegraphic circuit, which remains broken until the increasing temperature causes the mercury to rise in its tube, and complete the connection by contact with the second wire. A signal is instantly communicated to the central station, showing the danger and the precise building at which it exists; an indicator, usually placed near the door, further shows from which apartment the signal was made, directing the fireman to the precise place where his services are in demand. The thermometer is usually placed in the ceiling. Insurance companies make reduced rates upon buildings provided with this instrument. Other devices have employed the ignition of powder, the expansion of metallic rods, or the breaking of wires, but none are so delicate or so worthy of reliance as that described.

FIRE ANNIHILATOR. An apparatus bearing this name was patented by Mr. Phillips in 1849, and attracted a good deal of public attention, as it was expected at the time that it would supersede the ordinary fire-engine (q.v.). The object of this invention was to extinguish fires by pouring into the midst of the conflagration streams of carbonic acid, sulphurous acid, and other gases which do not support combustion. A bottle containing sulphuric acid was placed immediately over a mixture of chlorate of potash and sugar, which, again, was surrounded by a mixture of charcoal, niter, and gypsum. On breaking the bottle, the sulphuric acid drops upon the chlorate of potash and sugar, which, as is well known to chemists, produces immediately an intense combustion of the sugar; the heat from this fires the surrounding mixture, and dense volumes of the above-mentioned gases are evolved. It is found, however, to be practically of little value in ordinary fires, where the air has free access.

FIRE ARMOR, an appliance intended to facilitate escape from a burning building, or to enable a person to remain in it with safety while engaged in extinguishing a fire. It is in principle much the same as the submarine armor now in common use. Fire armors began to be used about half a century ago, but only within a few years have they been so constructed as to be practically effective. The latest invention is that of George A. Crofutt, of New York, called by him an "eye and lung protector." It is a mask for the face, which removes the noxious qualities of the air before it enters the lungs, and protects the eyes of the wearer from dust, smoke, etc., enabling him to "see as through a glass darkly" while laboring to extinguish a fire or to save life. A double shell of thin steel covered with India-rubber is held in place by an elastic band about the head. This shell is provided with eye-holes, in which are set plates of transparent mica. The India-rubber covering of the shell, falling a little below its edge, tightens itself so closely as to prevent the intrusion of smoke and dust. For the protection of the lungs, a porous curtain, suspended from the covering of the shell, falls below the chin and is drawn by a string closely around the neck of the wearer. Within the curtain and over the mouth and nostrils is placed a moist and carefully filtered sponge, through which the wearer breathes, and which, while cooling the air, divests it of its noxious qualities. This ingenious appliance is very light, and may be fitted to its place almost as quickly as a man puts on his hat. Many experiments have proved its efficacy. The wearer is able to remain from 20 minutes to half an hour in a room filled with smoke and foul gases.

FIRE-ARMS may be defined as vessels—of whatever form—used in the propulsion of shot, shell, or bullets, to a greater or less distance, by the action of gunpowder exploded within them. They have played so great a part in the world's story, that their invention, development, and science deserve careful analysis. At a more advanced period, an obvious division of the subject into cannon, mortars, and small-arms presents itself; but in the infancy of the invention, and amid the obscurity enshrouding it, we can only seek to inquire into the origin of fire-arms generally.

The invention of gunpowder bears so directly upon the gradual introduction of fire-arms, that it will be well to consider the two discoveries concurrently. The widely prevalent notion that gunpowder was the *invention* of friar Bacon, and that cannon were first used by Edward III. of England, must be at once discarded. It is certain that gunpowder differed in no conspicuous degree from the *Greek fire* of the Byzantine emperors, nor from the *terrestrial thunder* of China and India, where it had been known for many centuries before the chivalry of Europe began to fall beneath its leveling power.

"Niter," says sir George Staunton, "is the natural and daily produce of China and India; and there, accordingly, the knowledge of gunpowder seems to be coeval with that of the most distant historic events." The earlier Arab historians call saltpeter "Chinese snow" and "Chinese salt;" and the most ancient records of China itself show that, when they were written, fire-works were well known several hundred years before the Christian era. From these and other circumstances, it is indubitable that gunpowder was used by the Chinese as an explosive compound in prehistoric times; when they first discovered or applied its power as a propellant, is less easily determined. There is an account of a bamboo tube being used, from which the "impetuous dart" was hurled a distance of 100 ft.; this was at a very early period, but it is difficult to say precisely when. It is recorded, however, that in 618 B.C., during the Taing-off dynasty, a cannon was employed, bearing the inscription: "I hurl death to the traitor, and extermination

to the rebel." This must almost necessarily have been of metal. We have also curious evidence in regard to the armament of the great wall; for capt. Parish, who accompanied lord Macartney's mission, reported that "the soles of the embrasures were pierced with small holes, similar to those used in Europe for the reception of the swivels of wall-pieces. The holes appear to be part of the original construction of the wall, and it seems difficult to assign to them any other purpose than that of resistance to the recoil of fire-arms." If this surmise be correct, the use of jingalls would be carried back to three centuries at least before the Christian era. Stone mortars, throwing missiles of 12 lbs. to a distance of 300 paces, are particularly mentioned as having been employed in 757 A.D. by Thang's army; and in 1232 A.D., it is incontestable that the Chinese besieged in Caifong-fou used cannon against their Mongol enemies. Thus, the Chinese must be allowed to have established their claim to an early practical knowledge of gunpowder and its effects.

It seems likely, however, that the principles of fire-arms reached Europe from India rather than China, and that country has equal, if not superior, claims to the first acquaintance with the art. The ancient Sanscrit writings appear to point very plainly to the operation of some primitive sort of cannon, when, in recording the wars of the Egyptian Hercules in India, it is stated that the sages remained unconcerned spectators of the attack on their stronghold, till an assault was attempted, when they repulsed it with whirlwinds and thunders, hurling destruction on the invaders; and a Greek historian of Alexander's campaign testifies that the Hindus had the means of discharging flames and missiles on their enemies from a distance.

These Indian philosophers seem, from the writings of Ctesias and Ælian, to have also possessed an unquenchable fire similar to that employed later by the Greeks. Passing from these very early times, in which there is reason to believe that some sort of great gun was employed, we come to the comparatively recent date, 1200 A.D., when their use is established beyond a doubt, for Chaséd, the Hindu bard, writes (in stanza 257) that the culivers and cannons made a loud report when they were fired off, and that the noise of the ball was heard at the distance of about ten coss, which is more than three quarters of a mile. In 1258, the vizir of the king of Delhi went forth to meet the ambassador of Hulaku, the grandson of Genghis Khan, with 3,000 carriages of fire-works (in the sense of weapons, probably a sort of rude muskets). In 1368, 300 gun-carriages were captured by Muhammed Shah Bahmiani. The use of cannon had so far advanced in India by 1482, that they were even used for naval purposes; shells having been employed two years earlier by the sovereign of Guzerat. In 1500, the Portuguese had matchlockmen to contend with, as well as heavy ordnance. Pigafetta, in 1511, found the town of Borneo defended by 62 pieces of cannon mounted on the walls. So much for the antiquity and apparently common use of fire-arms in China and India, at times long antecedent to any knowledge of them in Europe, and during the period at which they were scarcely developed in an effectual degree. Most of the pieces discovered in India, and supposed to be of early manufacture, are composed of parallel iron bars welded together, and very often they had a movable breech-piece.

The knowledge of gunpowder and fire-arms may be presumed to have extended in a westerly direction through the Arabs, whom we find using them possibly in 711 A.D., under the name of *manjaniks*, and certainly very early in the 14th century. The Byzantine emperor, Leo, introduced "fire-tubes" between 890 and 911, for use in connection with Greek fire; and there can be little doubt that these were a species of cannon, probably of small bore. In Spain, both Moors and Christians used artillery as early as the 12th century.

Friar Bacon was conspicuous among his contemporaries for his general learning, and we have no evidence to show whether he discovered the ingredients of gunpowder independently of foreign aid, or whether he derived the knowledge from some ancient MSS.; the latter, however, seems the more likely conclusion, as sir F. Palgrave brought to light in the Bodleian library a letter from a Spanish friar, brother Ferrarius, who was a contemporary of Bacon, in which the materials of Greek fire are detailed, differing only in proportions, and in these but slightly, from real gunpowder. That the latter was identified of old with Greek fire, is shown by the name "Crake," applied to the first cannon used. This word, which still survives in "cracker," is pointed out by sir F. Palgrave to be nothing more than a Norman corruption of "Grec." Bacon's announcement dates from 1216; but the powder of his time, as made in the west, was not readily explosive, since the materials were but roughly cleared of impurities, and then mixed together on a slab, and probably little use could be made of it as a propellant until the process of granulating had been introduced by Bertholdus Schwartz in 1320. Immediately after this discovery, cannon of small size appeared in the armory of almost every state, as if their use had been known previously, although no practical effect had been given to the knowledge, on account of the badness of the powder manufactured. These cannon generally consisted of a smaller barrel or chamber to receive the charge, which fitted into a larger one containing the projectile. It may be safely assumed that these weapons, if terrifying from their noise, were tolerably harmless—at least to the enemy—in their practice. In 1326, the Florentine republic ordered the making of iron shot and cannon for the defense of its villages. In 1327, Edward III. used "crakeys of war" against the Scotch; in 1339, 10 cannons were employed in the

siege of Cambray. By 1346, various improvements had been made; and we find in the same year the consuls of Bruges witnessing experiments by one Peter, a tinman, who had constructed a cannon with a square bore, to throw a cubical shot of about 11 lbs.; his bolt passed both walls of the town, and unfortunately killed a man on the other side. We have the authority of Villani for believing that Edward III. had three cannon at Crécy; but the cannon then made were, from the little knowledge of casting, limited to about the size of modern duck-guns, and, as has been remarked, three very inferior muskets could have had but little to do with putting 50,000 men to flight.

Up to this time European ordnance had been kept back by the rarity and high prices of sulphur, saltpeter, and iron, the last having been so scarce in England, that it was thought necessary to forbid its exportation by a statute of 28 Edw. III. Still, crude as was their form, and small their number, fire-arms had established a firm footing in Christendom; their mission of civilization, and, paradoxical as it may appear, of humanity, had begun. With the first killing discharge, the doom of feudalism had gone forth. Plated armor no longer availed against the weapon of the peasant; and the mailed chivalry, the sinews of previous battles, who had trampled with their iron heels upon popular rights, no longer could carry all before them, but, like other soldiers, were now as loath to be slain by unseen foes as the veriest villein in the host. The people discovered their powers of contending with the noblesse; by degrees, they rose for liberty, and suppressed the tyrannies of the petty lords who had long held them as mere bondsmen. In war, again, as artillery became more general, so the slaughter of battles diminished, for an army outmaneuvered was an army at the enemy's mercy, and therefore beaten; whereas, previously, in the hand-to-hand fights where victors and vanquished mixed pell mell in single combat, a victory could only be really won when there were no foes left to slay. A battle as great as that at Crécy might now be gained with a loss to the vanquished of not more than 1000 men, instead of the 30,000 who are said to have fallen victims to the English sword or bow.

Dating from the reign of Edward III., the employment of cannon and bombards in siege operations became more or less general. Froissart records that the black prince took bombards, cannon, and Greek fire to the reduction of the castle of Romozantin in 1356, but it does not appear that he availed himself of fire-arms at the battle of Poitiers in the same year. The bombards seem to have been short, capacious vessels, from which stone balls were shot with small charges to a short distance, and at considerable elevation; they were essentially the parents of the present bombs or mortars. The cannon (*canna*, a reed), on the other hand, were, for some time at least, of extremely small bore, scarcely larger than muskets of the 18th c.; they discharged leaden bullets, and would have probably been used as hand-weapons, but for their cumbrous and heavy workmanship, which necessitated small carriages. Arms of this description are doubtless those referred to as having been brought by Richard II. to the siege of St. Malo, to the number of 400 pieces, where they are said to have kept up an incessant fire day and night on the town *without* success.

In the 15th c., armies for siege operations were usually accompanied by great and small guns, the latter being intended to keep down the fire of the besieged while the large bombards were being loaded, an operation requiring no small time. These guns were gradually improved, but it was not until the reign of Henry VIII. that the founders succeeded in casting iron ordnance, to the entire exclusion, until quite the present day, of cannon formed of square or rounded bars welded together. England had even then become famous for the workmanship of its ordnance. A gun found in the wreck of the *Mary Rose*, which sunk at Spithead in the above king's reign, shows that a degree of excellence had been attained in the manufacture of artillery, little inferior to that which has lasted till our own day, when rifled ordnance are rapidly superseding cannon of smooth bores. Still, so late as Henry's reign, although great guns were found very serviceable in siege and naval operations, where the defenses of those days offered but a trifling resistance to their power, they appear to have been looked upon rather as an incumbrance than an advantage with armies in the field. This is attributed partly to the heavy character of the guns themselves, and especially of their carriages, but more particularly to the badness, or rather absence, of the necessary roads for their transport. In 1552, it is recorded in the state papers that the "kinges ordonauns [were] unable to pass over Stanes More towards Carlile."

As time passed on, the details of the manufacture were improved, the general principles remaining the same; the size of the guns increased, while the proportionate weight of the carriages diminished; limbers (q.v.) were added, and the equipage of a gun gradually perfected and lightened. With increased caliber, to which augmented range was usually added, the number of cannon—at one period enormous—taken with an army was by degrees reduced, until now a certain standard proportion between artillery and infantry is ordinarily maintained. Three guns to a thousand infantry is the proportion now considered best. Of course, this proportion differs with the opinions of various commanders; but the greatest modern generals have always acted on the maxim, that it is wasteful to send a soldier on any duty of danger which a ball can be made to perform. As a weapon of offense, Vauban doubled the utility of heavy ordnance when he applied the ricochet (q.v.) system of firing. Napoleon may almost be said to have won his battles by artillery, for he rarely, if ever, brought his infantry into action except as supports, until a way had been opened for them, or a panic caused,

by the massed fire of large batteries of guns. The duke of Wellington also devoted the greatest attention to his ordnance train; while, referring to recent events, the campaigns of lord Clyde in India were remarkable instances of the use of artillery being pushed with abundant success to its greatest limit. During the Franco-German war of 1870–71, the Prussians were considered somewhat behind the age in their use of artillery.

Cannon of widely varying bores have at different times been cast, and the various sorts became so numerous in continental armies, as at one time to cause much inconvenience from the large quantities of ammunition which it was necessary to carry. Gustavus Adolphus set the example of reducing his guns to a few standard calibers, and the same improvement was immediately adopted systematically in the French and other armies. The introduction of rifled guns of late years has limited the classes in use in the British army to the following: *Muzzle-loaders*—16-in., 80 tons; 12.5-in., 38 tons; 12-in., 35 tons; 13.5-in., 23 tons; 12-in., 25 tons ("Woolwich infants"); 11-in., 25 tons; 10-in., 18 tons; 9-in., 12 tons; 8-in., 9 tons; 7-in., 7 tons, 6½ tons, and 90 cwt.; 80-pounder of 5 tons; 64-pounder; 40-pounder; 25-pounder; 16-pounder; 9-pounder; 7-pounder (steel) mountain-gun. *Breech-loaders*—7-in., 64-pounder, 40-pounder, 20-pounder, 12-pounder, 9-pounder, 6-pounder. See CANNON, CARRONADES, GUNNERY, HOWITZER.

The mortar differs from all other guns in its solidity of form, its shortness, and its large bore. The object is the projection of shells by a more or less vertical fire, with the intention of breaking through and destroying, by weight and explosion together, roofs of magazines, public buildings, and so on, or of sinking a shell deep into earthworks of a fortress, in which it shall explode as a most deadly mine. The different sorts of mortar will be described under MORTAR. The mortar arose naturally out of the old bombard, and doubtless deviated by degrees more and more from the cannon. In very early days, we read in Arabian authors of a cylinder hewn in the rock at Alexandria, and used as a mortar. Such a cylinder, and of large size, is still to be seen at Gibraltar, where it was employed in the last siege against the Spanish, when it was made to discharge volleys of large stones, which spreading at times to a distance of 500 yards, constituted a formidable means of defense. In recent years, nearly all guns fire shells, so that the specific necessity for mortars has greatly diminished.

A gun is a frustrum of a right cone, with a cylinder (bore) removed around the axis; from which it follows that the thickness of metal is greatest at the breech, where it has to withstand the effect of ignited powder in its most condensed, and therefore most powerful state. Guns are first cast in loam or dry sand, then turned to the required shape, and lastly bored with the minutest accuracy. Formerly, they were cast with the bore already formed; but the direction was rarely exactly correct, and the surface scarcely ever strictly even. Some additional particulars of their manufacture will be given under GUN-FACTORIES, ROYAL; and the science of artillery will be summarized under GUNNERY.

An article on fire-arms would be incomplete without some allusion to the progress made in small-arms. In the 15th c., the smallest sort of cannon were probably at times mounted and used as hand-guns. From this the step to the arquebus was rapid; that weapon developed as years passed into the clumsy matchlock; that into the firelock and flint-musket; then the percussion-musket; and lastly, into the beautiful rifles of our own day, which have culminated in the central-fire breech-loaders. For diminutives, small arquebuses were made to do duty as horse-pistols; genuine pistols succeeded them: these were gradually improved and reduced in size, till they have culminated in the saloon pistol, available for a waistcoat pocket; and the deadly revolver, with its multiplied shooting power. All these weapons are described under their respective heads—ARQUEBUS, MATCHLOCK, MUSKET, PISTOL, REVOLVER, RIFLE.

Many valuable works have been written on fire-arms from the days of Leonardo da Vinci and Tartaglia to the present. Among those consulted for this article have been *Études sur le Passé et l'Avenir de l'Artillerie* of the emperor Napoleon III.; *Our Engines of War*, by capt. Jervis; maj. Straith's *Treatise on Artillery;* gen. Chesney *On Fire-arms*, etc.

FIRE-ARMS, PROVING OF (in law). In consequence of the frequency of accidents from the bursting of insufficient barrels, the legislature has made it imperative that all barrels made or imported should be regularly proved in a public proof-house. A royal charter granted in 1637 to the London gunmakers, gave them powers to search for and prove and mark all manner of hand-guns, great and small daggs, and pistols. The several statutes of 1813, 1819, and 1855, rendering the proving of fire-arms compulsory, have been superseded by "the gun-barrel proof act, 1868" (31 and 32 Vict.), regulating the duties and powers of the proof-houses in London and Birmingham (the only two in England). By this statute the forging or counterfeiting of the proof-marks or stamps is treated as a misdemeanor punishable by imprisonment for not more than two years; and a fine of £20 is imposed on any person selling or exposing for sale barrels not duly proved, or exporting or importing barrels with forged proof-marks. These penalties are to be levied on conviction before two justices or a metropolitan or stipendiary magistrate. The statute does not extend to Scotland or to Ireland, and arms manufactured for her majesty are exempted from its operation.

FIRE-BALLS are projectiles occasionally discharged from guns or mortars, for the purpose either of setting fire to, or of merely illuminating some work, against which hostile operations are directed. The usual ingredients are—mealed powder, 2; saltpeter 1½; sulphur, 1; rosin, 1, turpentine, 2½; with pitch, tow, naphtha, etc., as circumstances dictate. The use of fire-balls has, however been in great measure superseded by the introduction of rockets (q.v.), and incendiary shells (q.v.). Akin to the fire-ball, was the *fire-arrow* of ancient warfare, which consisted of tow steeped in pitch, rosin, or some inflammable mixture, wrapped round the shaft, and fired alight among an enemy's works or troops. Greek fire was also discharged in many cases on large arrows surrounded by tow and shot from *balistæ*.

FIRE-BOTE, the right of a tenant for life or years, according to English law, to cut wood on the estate for the purpose of fuel. See ESTOVER.

FIRE-BRICK. See BRICK.

FIRE-CLAY is the variety of clay which is employed in the construction of gas-retorts, glass-pots, fire-bricks, crucibles, etc., which require to withstand high temperatures. It is found chiefly in the coal measures; and the more famous kind is the Stonebridge, which is found in a bed about 4 ft. thick. It also occurs largely near Glasgow, Newcastle-on-Tyne, and in Belgium and France. The principal constituents of fire-clay are silica and alumina, accompanied by small proportions of iron, lime, magnesia, water, and organic matter, as may be observed from the following table:

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Silica	64.10	51.10	48.55	69.25	83.29
Alumina	23.15	31.35	30.25	17.90	8.10
Oxide of Iron	1.85	4.63	4.06	2.97	1.88
Lime	.....	1.46	1.66	1.30	
Magnesia	0.95	1.54	1.91		2.99
Organic Matter and Water	10.00	10.47	10.67	7.50	3.64

Fire-clay is found abundantly near and at the surface of the ground, and is readily reduced to powder by traveling wheels. When kneaded with water, and fashioned into vessels and other articles, it is dried, and is then generally subjected to a strong heat, which drives off the water and organic matter, causes the silica to unite more firmly with the alumina, etc., and leaves a more or less porous material, which can withstand very high temperatures. The Passau crucibles are merely dried, and are not fired like Hessian crucibles and other fire-clay wares. The larger the percentage of silica (sand) in the clay, the more refractory are the articles fashioned from it; and hence sand is often added to clay to increase its fusing-point and refractory powers; but a certain proportion of alumina, etc., is required to serve as a flux, to cement and hold together the particles of sand. The proportions of sand and clay are determined by the temperature to which the manufactured article is intended to be exposed; and the fire-clay of crucibles or bricks, which are serviceable at a comparatively low temperature, as in the lining of lime-kilns, would become soft, and yield in glass or porcelain furnaces.

FIRE-DAMP is the miners' term applied to light carburetted hydrogen or coal-gas when it issues from crevices in coal-mines. See GAS.

FIRE-EATING, a name usually given to a variety of feats performed by jugglers with flaming substances, melted lead, red-hot metal, etc. Evelyn, writing under date Oct. 8, 1672, thus describes fire-eating in his day: "I took leave of my lady Sunderland. She made me stay dinner at Leicester house, and afterwards sent for Richardson, the famous fire-eater. He devoured brimstone on glowing coals before us, chewing and swallowing them; he melted a beer-glass, and eat it quite up: then taking a live coal on his tongue, he put on it a raw oyster; the coal was blown on with bellows till it flamed and sparkled in his mouth, and so remained till the oyster gaped, and was quite broiled; then he melted pitch and wax with sulphur, which he drank down as it flamed; I saw it flaming in his mouth a good while. he also took up a thick piece of iron, such as laundresses use to put in their smoothing-boxes, when it was fiery hot, held it between his teeth, then in his hand, and threw it about like a stone; then he stood on a small pot, and bending his body, took a glowing iron with his mouth from between his feet, without touching the pot or ground with his hands; with divers other prodigious feats." About 1818, Signora Josephine Girardelli, who described herself as the "original Salamander," performed astonishing feats of this kind in London and other places in England. According to the accounts of her, "she commences her performances by passing plates of red-hot iron over her legs; she then stands with her feet naked on a plate of red-hot iron, and afterwards draws the same plate over her hair and across her tongue," etc. About the same time appeared in Paris, M. Chaubert, whose astonishing powers of resisting heat attracted the attention of the national institute. Among other things performed by this person, was his going into a common baker's oven, with a leg of mutton in his hands, and remaining with the oven closed until the mutton was completely dressed. Another of his performances was standing in a flaming tar-barrel until the whole of it was consumed around him. He subsequently exhibited in London.

Many of the feats of this kind are undoubtedly mere tricks, or illusions, produced by slight of hand; others are capable of scientific explanation. There is nothing more wonderful than stuffing blazing tow into the mouth—a common form of mountebank fire-eating—than in eating flaming plum-pudding, or in dipping the finger into spirits and letting it burn like a candle. It is also well known that the tongue, or the hand dipped in water, may be rubbed with impunity against a white-hot bar of iron; the layer of vapor developed between the hot metal and the skin prevents contact and produces coolness (see SPHEROIDAL CONDITION OF LIQUIDS). Such performances as those of M. Chaubert are explained by the well-known power of the living body to maintain its normal temperature for a time, independently of the external temperature (see ANIMAL HEAT.

FIRE-ENGINE, a machine employed for throwing a jet of water for the purpose of extinguishing fires. This name was formerly applied to the steam-engine. Machines for the extinguishing of fires have been used from a very early date. They were employed by the Romans, and are referred to by Pliny; but he gives no account of their construction. Apollodorus, architect to the emperor Trajan, speaks of leathern bags, with pipes attached, from which water was projected by squeezing the bags. Hero of Alexandria, in his *Treatise on Pneumatics*—written probably about 150 years before the Christian era—proposition 27, describes a machine which he calls "the siphons used in conflagrations." It consisted of two cylinders and pistons connected by a reciprocating beam, which raises and lowers the pistons alternately, and thus, with the aid of valves opening only towards the jet, projects the water from it, but not in a continuous stream, as the pressure ceases at each alternation of stroke.

Little or nothing is known as to the extent to which engines of this kind were practically used. We have accounts of "instruments for fires," and "water syringes useful for fires," in the building accounts of the city of Augsburg, 1518; and in 1657, Caspar Schott describes a fire-engine used in Nuremberg, which must have been almost identical in construction with that described by Hero. It had a water-cistern, was drawn by two horses, was worked by 28 men, and threw a jet of water, an inch in diameter, to a height of 80 feet. It was not until late in the 17th c. that the air-chamber and hose were added; the first being mentioned by Perrault in 1684, and the hose and suction-pipe being invented by Van der Heide in 1670. In England, hand-squirts were used up to the close of the 16th century. They were of brass, and contained 3 or 4 quarts of water. Two men held the handles at the sides, while a third forced up the piston. The nozzle was dipped in a vessel of water after each discharge, then raised, and the water again forced out. So clumsy an apparatus could have been but of little service in the fearful conflagrations to which our old wood-built towns were so subject.

With the addition of the air-chamber and hose, and some improvement in the details of construction, the "siphons" of Hero became the modern fire-engine. The mechanism consists of a cylindrical air-chamber; two cylinders with pistons, one of which ascends while the other descends; a pipe leading to each cylinder to supply it with water, and one leading from each to the air-chamber; and a pipe extending nearly to the bottom of the air-chamber which conveys the water to the hose.

The rising piston raises the water from the source of supply to fill its cylinder, and a valve prevents the backward flow of the water; the descending piston forces the water contained in its cylinder into the bottom of the air-chamber, where another valve is located, and thereby compresses the air. The pistons rise and descend alternately. The compressed air reacts by its elasticity, and pressing upon the surface, forces the water through the hose. In the space above the surface of the water, the whole of the air that formerly filled the chamber is supposed to be compressed. Assuming this to be one third of its original bulk, its pressure will be about 45 lbs. to the sq. in., and this pressure will be continuous and nearly steady, if the pumps act with sufficient force and rapidity to keep the water at that level. As air may be compressed to any extent—and its elasticity is increased in exactly the same proportion—the force that may be stored in the compressed air is only limited by the force put upon the pumps, and the strength of the apparatus.

Under proposition 9 of the same work, in which "the siphons used in conflagrations" are described, Hero describes and figures the air-chamber as "a hollow globe or other vessel, into which if any liquid be poured, it will be forced aloft spontaneously and with much violence, so as to empty the vessel, though such upward motion is contrary to nature. The globe is represented with a single piston attached for compressing the air. Thus, about 1800 years elapsed before proposition 9 and proposition 27 of this work were put together for so obvious and useful a purpose as the fire-engine, although the book was tolerably well known to the mathematicians of the period; and when they were put together, it was probably done by a practical man, who had never heard of the name of Hero.

The more recently constructed fire-engines include contrivances for preventing the entrance of mud and gravel, and for getting readily at the valves in case of their being out of order, while the cistern is dispensed with, a hose being carried directly to the water-supply. They are usually drawn by two or four horses, though smaller engines are made to be drawn by hand or by one horse. The hose is of leather, fastened

by metal rivets, instead of the sewing formerly used. In the United States, cotton is woven into a tube by machinery constructed for the purpose. Two such tubes are fitted one within the other, and held together by a solution of India-rubber, which, on consolidating, forms a water-tight layer.

The fire-engines of the London fire brigade establishment have usually 6-in. barrels with 7-in. stroke, and throw about 70 gallons of water per minute. Their weight, with implements, firemen, and driver, is about 30 cwt. These are found more convenient for general purposes than larger engines, as they can be drawn at a gallop by two horses for a distance under six miles. Four horses are used for greater distances. When a large engine is required, two of these may be joined together, and throw 180 gallons per minute. The pumps are worked by levers, with long horizontal bars attached, to enable a number of men to work together upon the same pumps. Many larger engines than these have been constructed, and steam has been successfully applied. The first application of the steam fire-engine was made when the Argyle rooms in London were burned in 1830. Several floating fire-engines for conflagrations near the Thames have been constructed and worked by steam; one of these is capable of throwing 1400 gallons per minute. A floating engine was used with considerable effect when the houses of parliament were burned; but at the fire of the warehouses near London bridge (1861), the fury of the combustion, when at its maximum height, was so great, that the combined efforts of all the London engines, whether worked by steam or by hand, had no perceptible effect in subduing it. For all ordinary fires, the hand-engines above referred to are the most useful, as they can be brought to the spot and set in action immediately. Nevertheless, so greatly have the steam fire-engines been recently improved, that steam of 100 lbs. pressure on the square inch can be raised in seven minutes after making the fire.

It has been questioned whether, in cases of very intense combustion, a comparatively small stream of water has any subduing effect at all—some assert that it may even increase the conflagration. Various chemical liquids have been proposed as flame-extinguishers; but plain water is still the only power used to any extent.

Fire-Brigades.—For working fire-engines, a body of *firemen* are required. The fire insurance companies formerly had separate establishments of fire-engines and firemen; but in 1825 some of them united, and by 1833 all the important companies combined, and the London fire-brigade was formed, under the management of the late Mr. Braidwood, whose death in the discharge of his duties at the great fire just referred to was justly deplored throughout the country as a national loss. In 1865, an act of parliament empowered the metropolitan board of works to purchase the engines and appliances of the London fire-brigade establishment; to secure the services of the brigade men; to construct additional engines and stations; to map out the metropolis into convenient districts; and to cause the firemen to act in harmony with a salvage corps and a fire-escape corps. The engines now used are very powerful; the manual engines are for 22, 26, 30, 38, and 46 men each; while the steam fire-engines, especially those constructed by Messrs. Shand and Mason, on a principle patented in 1870, will throw a jet to a vertical height of 180 ft., or drive water through half a mile of pipe horizontally. At a fire in the East India docks in 1866, the steam fire-engines poured in the enormous quantity of 3,000,000 gallons. At the great fire in London, in June, 1873—that of the Alexandra palace—a powerful force of engines was present, but there was insufficient water to render them effective. The establishment comprises about 400 firemen, 55 stations, 90 manual engines, and 35 steam-engines (5 of them floating). As the metropolitan board in London pay a fee to the first person who gives notice of a fire at the engine station, there is always a supply of volunteers from among cabmen and people in the streets, besides policemen, to perform this important service; and in like manner the pump-bars of the fire-engines are always fully manned. The men of the brigade wear a uniform, with strong helmets and metal epaulets, to protect them from the blows of falling beams, etc. The courage and skill of the men in making their way through and about burning buildings, for the purposes of directing the steam from the hose, or for saving life and property, and the general efficiency of the whole organization, are worthy of the highest praise. The water-supply in London is not so well managed as the engine-supply, thereby frustrating the exertions of the firemen.

Most of our provincial towns now have a fire-brigade upon the same model as that of London. The fact that Paris has several times as many firemen as London, is a tolerable proof of the amount of work the London firemen are called upon to perform. At Paris, as on the continent generally, the fire-engines and firemen are under government control; and the *sapeurs pompiers*, or firemen, are empowered to enforce the assistance of any people they can find in the streets.

In many continental towns, fire-watchmen are stationed in commanding situations, such as church-towers; and their duty is to ring a fire-bell, or otherwise give the alarm, immediately upon observing a conflagration. The fire-companies of the United States are composed of volunteer firemen, who receive no pay, but certain immunities from taxation and militia service. Their annual parade-day is quite a fête. Each company has a special uniform; and in some cities the rivalry among them is so great, that they frequently have desperate fights for the best "location" for their engines. Prizes are awarded to those whose engines throw a jet of water to the greatest height. An admira-

ble system of electro-telegraphy has been adopted, to give notice from station to station in the event of fire. Nevertheless, American conflagrations are often frightfully destructive: witness those at Chicago in 1871, and at Boston in 1872 and 1873.

In Constantinople, there are two fire-towers, one on each side of the golden horn, with watchmen continually stationed there. A large wicker-ball is hauled up to the side of the tower as a signal, and the cry of "There is a fire at Scutari, Tophané," or whatever be the quarter of the city in which it occurs, is raised and taken up by the patrol, who strike the pavement with their iron-bound staves as they repeat the cry. In a few minutes, the alarm is thus spread throughout the whole city.

FIRE-ENGINE (*ante*), some form or combination of forcing pumps for throwing a stream of water to extinguish a fire. A fire-engine with two pumps, and worked by levers or brakes, was invented in Egypt in the 2d c. B.C. For centuries the chief device for extinguishing fires was the hand syringe or "squirt." In England its use was discontinued for a long time, leathern buckets, ladders, and crooks taking its place; but was revived near the close of the 16th century. Specimens of the "hand-squirt" are still preserved in London as curiosities. It seems probable that a rude sort of engine was also used in London at a very early day. In Germany, huge syringes, mounted upon wheels, were in use in 1618. Paris had fire-engines of some sort at the beginning of the 18th century. In England, in 1734, engines of various construction were manufactured, the most successful of which was that invented by Newsham. Two of his machines, the first invention of the kind ever used in this country, were introduced in New York in 1731. It was more than fifty years after this that the leather valves within the cylinders were superseded by metallic valves, placed in valve-chests apart from the cylinders and the air-chamber. Rotary and semi-rotary pumps were also introduced, and are still used to some extent in London. Floating fire-engines worked by hand were used on the Thames before the close of the 18th century. In some cases the mechanism that worked the pumps was used to move the paddle-wheels. It was not until 1850 that floating fire-engines worked by steam came into use in England. An engine of this sort has done good service for years on the North and East rivers around New York. The first steam fire-engine is believed to be that made by Braithwaite in London in 1829. Ericsson built one in New York, about 1840, similar to Braithwaite's; and Latta, in Cincinnati, produced, in 1850, the first machine which was practically useful. Cincinnati was the first city in the United States to organize a steam fire department, but other large cities and towns rapidly followed the example. The steam fire-engines now in use may be classified as having reciprocating pumps without fly-wheels, reciprocating pumps with fly-wheels, and as rotary engines. The Amoskeag company (Manchester, N. H.) builds a very effective engine, which by a simple addition is self-propelling; a pole may also be attached, that the machine may be drawn by horses. The fly-wheel shaft is provided with a pulley, from which a chain connection furnishes motive power to a larger pulley in the back driving-axle. The pulley on the fly-wheel shaft may be disconnected when the engine is pumping. On the road the engine is steered by a large wheel upon an upright shaft in front of the driver's seat; a pinion on the lower end of this shaft works in a horizontal gear-wheel, controls the front axle, and guides the machine. There is a differential gear by which one of the hind wheels may travel faster than the other when going round a curve. When standing in the engine-house, steam is maintained in a self-propelling engine, at about 80 lbs.; in steam-engines drawn by horses, at about 51 lbs.; this is done by attachment to a stationary boiler in the engine-house, fuel being laid in the furnace of the engine, to be ignited when leaving the house. See FIRE.

FIRE-ENGINE TESTS, INTERNATIONAL EXPOSITION, PHILADELPHIA, 1876.

NAME.	WEIGHT IN LBS.		DIAMETER.			BOILER.			PRESSURE PER SQ. IN.			STREAM.	
	Light.	With water.	Steam Cyl.	Water Cyl.	Stroke.	Diameter.	Height.	Surface.	Steam.	Water.	Diameter Nozzle.	Vertical.	Horizontal.
	Lbs.	Lbs.	Inch.	Inch.	In.	Inch.	In.	Sq. ft.	Lbs.	Lbs.	Inch.	Feet.	Feet.
Silsby	6,596	7,054	13.5	8.38	.....	40.	60	330	83.	139.6	1.46	174.7	203.4
Nichols	7,122	7,323	9.	6.	7.	40.	60	251	109.7	82.1	1.47	.....	202.9
La France	7,061	7,355	.....	.....	.....	40.	56	265	62.8	78.9	1.46	.....	47.7
Ronald	5,812	6,022	7.75	4.33	9.	32.	56	.....	67.7	64.1	1.32	.....	27.2
Clapp & Jones	3,310	3,505	7.	4.25	7.	28.	52	123	84.9	119.	1.01	.....	182.4
"	6,503	6,825	8.	4.63	8.	38	58	248	90.1	157.1	1.41	202.3	215.2
Button	5,035	5,225	12.	8.	4.5	34.5	60	190	65.6	83.2	1.24	.....	.....
Amoskeag	7,522	8,920	7⅝	4.5	8.	31.8	64	175	.....	.....	.....	.....	.....
"	6,105	6,264	8⅞	4.25	8.	30.5	61	151	.....	.....	.....	.....	.....
Clapp & Jones	3,925	4,098	8	4⅞	8.	32.	52	147	100.7	145.5	.96	192.3	160.4

FIRE-ESCAPES. An immense number of contrivances have been at different times proposed for enabling people to escape by windows and house-tops from burning buildings. They are of two distinct kinds—one for affording aid from outside, and the other for enabling those within the house to effect their own escape. Of the latter, the

simplest is a cord that should be firmly attached to the window-sill of every sleeping apartment, and coiled up either in a box on the floor, or under a dressing-table, or other suitable place. A rope one quarter or three eighths of an inch thick, and knotted at intervals of about a foot, is well adapted for the purpose. A good quarter-inch sash-cord will support from 3 to 4 cwt., or more if new, and will cost from 6*d.* to 2*s.*, according to the height of the room. A man with tolerable nerve may let himself down by means of such a cord, either by placing his feet against the wall and bringing "hand over hand" down upon the knots, or by clinging with his feet and knees to the rope as well as with his hands. A man may let down a woman or child by means of a sack at the end of the rope, or simply by fastening them to the end, and letting the rope pass through his hands, aided if necessary by the friction of the window-sill, if it be allowed to bend over it. A rope coiled upon a drum inside a dressing-table, with a winch-handle to uncoil it, is another form. A pulley fixed to the window-sill, over which runs a rope with a chair or simple board to sit on, is a well-known contrivance.

Some means of escape from every sleeping-room should be provided, and the inmates should be thoroughly prepared by knowing beforehand how to act in case of a fire cutting off communication with the usual means of outlet. In a row of houses with projecting balconies, a board of sufficient length to reach from the balcony of one house to the next may be kept in each room, or even a rope might be thrown across with the aid of a stone or lump of coal, etc., tied to one end. An exit by the roof or from the window on to the parapet affords a ready means of escape from a top story, and should always be provided in tall houses. In case of emergency, when no provision has been made, the cord holding the sacking of the bedstead may be undone, or the bedclothes and curtains tied together to form a rope; or as a last resource, the bedding may be thrown out of window to form a cushion to alight upon in case of the cord or bedclothes being too short to reach the ground; or if there be no time to extemporize such cordage, and it should be necessary to drop directly from the window, in this case, it would be better to hang by the hands from the window-sill and then drop, than to jump direct, as the height of the fall would be somewhat diminished thereby. In all such cases, presence of mind and coolness is of the utmost importance, and may render very simple and slender means of escape more effectual than the most complete and elaborate would be without these qualities; and presence of mind may be to a great extent acquired chiefly by being mentally prepared, and, if possible, by rehearsals of what should be done in case of danger.

Fire-escapes to be used from without, consist either of simple ladders kept in churches, police offices, or other convenient stations, or a series of ladders that can be jointed together; of poles with baskets attached; of ropes with weights at one end, that they may be thrown or shot into windows; of combinations of ladders, ropes, bags, baskets, nets, etc. The fire-escape now generally adopted by the society for the protection of life from fire, is a light carriage or frame-work on wheels, to which a series of ladders, etc., are attached. It is thus described by the society: "The main ladder reaches from 30 to 35 ft., and can instantly be applied to most second-floor windows by means of the carriage-lever." This projects on the opposite side to the ladder like the shafts of an ordinary carriage, and works upon the axle of the wheels as a fulcrum. "The upper ladder folds over the main ladder, and is raised into position by a rope attached to its lever-irons on either side of the main ladder; or, as recently adopted in one or two of the escapes, by an arrangement of pulleys in lieu of the lever-irons. The short ladder for first floors fits in under the carriage, and is of the greatest service. Under the whole length of the main ladder is a canvas trough or bagging made of stout sail-cloth protected by an outer trough of copper wire net, leaving sufficient room between for the yielding of the canvas in a person's descent. The addition of the copper wire is a great improvement, as, although not affording an entire protection against the canvas failing, it in most cases avails, and prevents the possibility of any one falling through. The soaking of the canvas in alum and other solutions is also attended to; but this, while preventing its flaming, cannot remove the risk of accident from the fire charring the canvas. The available height of these escapes is about 45 ft.; but some of them carry a short supplementary ladder, which can be readily fixed at the top, and which increases the length to 50 feet."

This society has upwards of 120 of these fire-escapes stationed in different parts of London. They stand in the roadway, and are each under the charge of a conductor during the night. Almost every house in London is within two or three minutes' run of one of these. Since 1836, when the operations of the society first commenced, they have saved thousands of lives. At one fire, nine lives were saved by one man and fire-escape. Fire-escapes of similar construction are now stationed in some of our provincial towns. When required, they are run to the burning house, the main ladder standing nearly upright all the while. It is then directed to the required window at a considerable inclination, and the attendant ascends the ladder, and helps the inmates either to descend by it, or if they are unable to do this, he lets them down by the canvas trough, which forms an inclined plane, along which they may easily and safely descend with the aid he is enabled to afford them.

FIRE-EXTINGUISHER (FIRE-ANNIHILATOR, *ante*), an apparatus for extinguishing fires by pouring upon them water surcharged with some substance of an anti-com-

bustible nature. The substance chiefly employed for this purpose is carbonic acid gas, the conveniences for generating which, for use at the moment it is wanted, are various. The ordinary fire-extinguisher is a cylindrical vessel, holding about eight gallons; it is made to be strapped to the back, and provided with a short hose and nozzle, through which a stream of considerable force may be discharged. The cylinder is filled with water, and within are two small vessels, one containing a bicarbonate, the other a strong acid. When the apparatus is to be used, the contents of these vessels are emptied into the water, and the carbonic acid, set free by chemical action, is taken up by the water. The pressure created by the confined gas forces out the liquid in a strong jet when the passage is opened. The gas, in coming in contact with the flames, assists in extinguishing it by excluding the atmospheric air. For subduing a fire in its first stages this contrivance is often very effective. The first apparatus of this kind ever brought into successful use was made in London in 1816. The contrivance for generating the gas was slightly different from that above described, although the principle was the same. Within the last 12 or 15 years various methods of charging the water in the cylinder have been devised. The Babcock extinguisher is filled with a solution of bicarbonate of soda, in which is suspended a vessel of acid, which is made to tilt over and discharge its contents into the solution when the stopper is withdrawn, thus freeing the carbonic acid. Use has also been made of salts in solution, which, as the water evaporates, are left incrusting the substances in combustion, thereby excluding the air, or, failing in this, giving off incombustible gases. Large cylinders filled with chemicals in the manner above described have been mounted on wheels, and, known as chemical fire-engines, have been used to some extent, but they are valuable only in the earliest stages of a fire. Various methods have been proposed for securing the automatic action of the fire-extinguisher through the increased temperature caused by fire, but they have not been very successful. An important adaptation of the fire-extinguisher has been applied to sea-going ships. A series of pipes on the upper deck communicate severally with various compartments of the hold, the coal-bunkers, the main deck, etc. The chemical agents are placed in a box, to which steam also may be admitted; when in action, the steam mingles with the carbonic acid and the two are conveyed to the place of danger, where they take the place of the air, smother, and finally extinguish the fire. The steam pipes are perforated along their sides that the distribution may be complete and positive. A system of distributing water, as in a planing mill or other factory, consists of an extended system of pipes placed near the ceiling of the different rooms and connected with a central supply, which may be a tank near the roof, or a pipe from a powerful engine. The distributing pipes are perforated with many small orifices, so small as to deliver the water in spray. If an alarm comes from a given room, the supply of water is turned to that room, which is instantly filled with spray.

FIRE-FLY, a name common to all winged luminous insects, at least to all that possess much luminosity. Except the lantern-fly (q.v.), they are all coleopterous, and belong to two nearly allied tribes, *lampyrides*, to which the glowworm (q.v.) also belongs, and *elaterides*, to which belong our skipjack beetles, and of which the larvæ are too well-known to farmers as wire-worms. The male glowworm, which alone is winged, has too little luminosity ever to receive the name of fire-fly, but the fire-flies of the s. of Europe (*lampyris italica*) and of Canada (*L. corusca*) are nearly allied to it. See GLOWWORM. Fire-flies are only seen in the most southern parts of Europe. They abound in almost all the warmer parts of the world, and the brilliancy of the spectacle presented by them when glancing about in numbers amidst the darkness of night, has been often described with enthusiastic admiration. Mr. Gosse says of the Canadian fire-fly: "The light is of a yellow color, very different from the blue gleam of the English glowworm: from this circumstance I at first took them for candles in the woods, and though told what they were, at every one that appeared, the same idea would come across my mind. . . . They more frequently give out the light while flying, than when crawling or resting, though we may often observe the intermittent gleam as one crawls up a stalk of grass, or rests on the leaf of a tree. They fly slowly, and as they fly, emit and conceal their light with great regularity at intervals of two or three seconds; making interrupted lines of light through the air, gleaming slowly along for about a yard, then suddenly quenched, and appearing again at the same distance ahead. The insect is a pretty beetle, with soft elytra, of a light-brown color, marked with red, and handsomely striped; the light proceeds from the last three segments of the abdomen, which are of a delicate cream color by day. At night these three segments are bright at all times; but at the regular intervals I have mentioned, they flash out with dazzling splendor. If this part be plucked off and crushed, many patches of brilliance occur for a few moments among the flesh, but they gradually die away." He further describes those fire-flies as appearing in great numbers in summer evenings, over wet and marshy ground, millions of them above a river, or over the surface of a large field, like stars on a clear winter night, but flashing and disappearing, and moving about in mazy evolutions.—But still more brilliant are the fire-flies of more tropical regions, belonging to the tribe *elaterides*, as the fire-fly of the West Indies (*elater noctilucus*), which gives out its light chiefly from two eye-like tubercles on the thorax. The light is so powerful, that the smallest print may be read by it; and this becomes quite easy if a few of the insects are inclosed in a small glass vessel. They are not

unfrequently employed—particularly in St. Domingo—to give light for household purposes; and they are used for purposes of decoration on festival-days by women, who attach them to their dress or to their hair. One which had been accidentally brought alive to Paris, once astonished and alarmed the Faubourg St. Antoine. These insects are caught in some parts of the West Indies—a torch being used to attract them—and brought into houses to destroy mosquitoes, which they eagerly pursue and devour. See LUMINOSITY OF ORGANIC BEINGS.

FIRE INSURANCE. See INSURANCE, *ante*.

FIRE ISLAND AND BEACH. Fire Island, or rather "the fire islands," in the last century, consisted of three very small uninhabited islands in the Great South bay of Long island. They were but a few acres in extent, and at high tide were almost submerged. "Fire island" now means the low, sandy spit of land, about 30 m. in length, which separates the larger portion of Great South bay from the Atlantic ocean. At its western end is Fire Island inlet, near which there is a lighthouse of the first order. The beach near the w. end is a place of summer resort for considerable numbers of people. On this beach Margaret Fuller Ossoli, with her husband and child, perished by shipwreck, July 16, 1850.

FIRELESS ENGINE, a form of steam or vapor engine which is detached from the heating apparatus. Dr. Emile Lamm, of New Orleans, invented an engine in which the motive power was derived from the vapor of ammonia. The ammonia, as it escaped from the engine, was passed into a reservoir of water, in which it was absorbed; the water when heated to a temperature of about 135° F., gave up the ammonia as gas, which was returned to the engine to be used over again, and then again absorbed and returned as before. This engine was found efficient and economical for the movement of street cars. The use of ammonia was soon abandoned, steam taking its place. Water heated to 212° F. becomes vapor, if the pressure upon it be no more than the usual atmospheric 15 lbs. per sq. inch. If the pressure be greater, the water remains liquid until a higher temperature is reached, the temperature varying with the pressure according to well-known laws. If steam at a high pressure be admitted to water of low temperature and pressure in a closed vessel, the steam will be condensed in the water, but the pressure in the vessel will be increased, while the volume of the water will be enlarged by the volume of that derived from the condensed steam. The water thus becomes charged with steam condensed under high pressure, and when the pressure is relieved, a portion of the steam reverts to its condition of vapor, and may be conducted in the usual way to a cylinder and piston, where it will do its customary work. The opening of the valves gives vent to the vapor, gradually reduces the pressure, and relieves the condensed steam; so that a tank, filled with water and stored with many times its volume of uncondensed steam, will furnish motive power sufficient to move the engine and a considerable train of cars for a trip of several miles. On its return, the tank is connected with a stationary boiler from which it receives a fresh supply of steam. It will not be forgotten that the real force of the steam is due to the heat which it contains, and that if the heat be lost, by radiation or otherwise, from the tank containing the condensed steam, its potential energy is so much reduced.

In applying these principles, the mechanism is that of an ordinary locomotive minus its fire-box, having a water-tank instead of a boiler; the appliances for stopping, starting, and backing, are as usual. The tank may be about 6 ft. long, and 3 ft. in diameter, covered thickly with felt and wood to retain its heat. Steam is taken until the gauge indicates 135 to 150 lbs., the temperature for 135 lbs. being 353°. With this accumulation of power the machine will run 5 to 7 m. before the pressure is reduced to 60. lbs. The labor and care of firing is avoided on one of these engines, but in other respects they require the same skill needed in the common locomotive. The fireless engine has been used in several large cities, but does not seem to commend itself to practical men.

FIRE'LOCK, the name applied on its introduction, in 1690, to the old musket, which produced fire by the concussion of flint and steel, to distinguish it from the *matchlock* previously in use, which had been fired by the insertion of a lighted match at the powder-pan. Writers of the earliest part of the 18th c. called firelocks "asnaphans," a word obviously corrupted from the Dutch *snaphaan*, and leading to the inference that they were brought to England by William III. and his Dutch auxiliaries. Their first invention is, however, involved in obscurity. The weapon was superseded before 1830 by the percussion musket; which, in its turn, has now yielded to the rifle (q.v.).

FIREMAN'S RESPIRATOR, invented by Dr. Tyndall. It is a combination of his own respirator of cotton wool moistened with glycerine, and Dr. Stenhouse's charcoal respirator. With this protection a man can remain a long time in the densest smoke.

FIRENZUOLA, ANGELO, an author distinguished for the Attic choiceness of his language, was b. at Florence in 1493. Having completed at Perugia the studies which he commenced in Florence, he proceeded to Rome in anticipation of a brilliant legal career, but shortly abandoned the eternal city, disappointed in hope and shattered in health. It seems well authenticated, that he finally enrolled himself among the monkish brotherhood of Vallombrosa, and rose to considerable influence, in spite of the extreme license of morals and licentiousness of writing for which he was noted. The date of his death

is doubtful, but it is generally placed between 1542 and 1544. His chief works are a spirited paraphrase of the *Golden Ass of Apuleius*—in which he is generally considered by his countrymen to have far excelled the original in nerve and beauty of language; *I Discorsi degli Animali*—containing some sound lessons of just legislation to the ruling powers, the censure being skillfully veiled by means of his animal orators; *I Ragionamenti*, a work in close imitation of the *Decameron* both as regards the impurity of sentiment, and classic purity of language; *Il Trattato della bellezza delle donne*, an eulogistic discussion concerning the charms of the gentle sex, to whom he was inordinately devoted. His works were published in Florence after his death. The best edition is that of Florence (1763, 3 vols.).

FIRE-POLICY. See INSURANCE.

FIRE-PROOF BUILDINGS. The problem of constructing warehouses, dwelling-houses, etc., that shall be proof against all risk of conflagration, has not yet been solved. The liability to conflagration may be greatly diminished by the construction of a building, but cannot be entirely averted; and therefore, in all "fire-proof" buildings containing furniture or other combustible materials of any kind, the ordinary precautions against fire should be strictly observed. It is well to state this at the outset, as, unless it be understood, a so-called fire-proof building may be more dangerous than an ordinary one, especially in warehouses, etc., intrusted to the care of watchmen and others, who, relying upon the supposed immunity the name expresses, are liable to neglect many precautions they would not fail to observe in a building believed to be dangerous. The most destructive fire that has occurred in London since 1666 was that at Cotton's wharf, in 1861, the warehouses of which were what is called "fire-proof." The great fury of this conflagration depended on the nature of the goods that were stored. It is scarcely possible to believe that such combustibles as tallow, turpentine, etc., could have been stored in the vicinity of saltpeter, unless there had existed some faith in their practical isolation from each other by the fire-proof divisions of the building, as it is so well understood that saltpeter, though incombustible of itself, intensifies to an immense extent the combustibility of all combustibles, by supplying them with undiluted oxygen when heated in contact or within a moderate distance of them.

The nearest approximation to fire-proof construction may be obtained as follows: The walls should be of stone or brick, and any ties, lintels, etc., required in the construction should be of iron. The staircases should be of iron or stone, and the floors or landings of tiles, concrete, or stone. Wherever wood is inevitably used, it should be prepared with silicate of soda (see FIRE-PROOFING). Instead of wooden joists to support the floors of each story, arched stone or brick work should be used, and this should be put together with sufficient care to be independent of the mortar. The roof should be constructed in like manner, wooden rafters being entirely excluded. The doors should be of iron, and the security would be much increased if the doors between any two apartments containing combustible materials were double, with a space between them equal to the thickness of the walls. Of course, it is not practicable to carry out all these precautions in a dwelling-house, but the danger from fire may be considerably diminished by attending to some of them. Wooden staircases are especially dangerous. The most important conditions for a warehouse are, that each apartment shall be separated from the next by stout walls of non-conducting materials, and more especially, that each shall be as nearly as possible air-tight; and whenever, from the nature of the goods, ventilation is required, it should be obtained by periodically opening the doors and windows. If this latter condition is fulfilled, any fire would extinguish itself, unless there be along with the combustible goods some oxygen-giving substance, such as saltpeter, chlorate of potass, or other nitrates or chlorates.

At first sight, it may appear that a warehouse built entirely of iron would be effectually fire-proof, but this is far from being the case. In the first place, iron conducts heat more readily than any other material used in building; secondly, cast-iron is liable to crack and split when suddenly heated or cooled. Iron supports may, under some circumstances, be even more objectionable than wood, for if the water from a fire-engine were to play upon a heated cast-iron girder, it would probably give way immediately, while a stout wooden beam might be extinguished before being burned through. When buildings supported by iron girders are burning, they are far more dangerous to firemen than those with wood, as the experienced fireman can form a pretty accurate judgment of the time that burning wooden beams will stand, and may move about in their vicinity to direct the stream of water to where it is most needed, but iron girders split and fall without visible notice. It is on this account that floors of arched masonry are recommended above. In great fires, the heat is sufficient to fuse iron.

Without going to the expense of making warehouses and manufactories absolutely fire-proof, certain precautions not of a costly nature might be usefully adopted, for the purpose of merely checking the progress of conflagration until the arrival of fire-engines. Among these simple measures, may be included iron doors hinged on stone between different departments: a sufficient deafening not easily destructible between the ceiling of one story and the floor of that above; and stone stairs. For rendering timber difficult of combustion, see FIRE-PROOFING. See also SAFES, FIRE-PROOF.

FIRE-PROOF BUILDINGS (*ante*). Many attempts have been made to construct buildings in such a manner and of such material as to make them indestructible by fire, but they have been only partially successful. It is easy to employ incombustible materials in the construction of walls, floors, stairways, doors, etc.; but it is not so easy to make them proof against disintegration from intense heat and the application of water. In the great Chicago and Boston conflagrations it was found that walls of granite, brick, and marble, which no fire could consume, crumbled into ruin under the combined influence of fire and water, and so were no barrier to the progress of the flames. The fire could hardly have made its way more rapidly or surely if all the buildings in its path had been of wood. Hard-burned bricks no doubt make the safest walls and partitions, while ceilings and floors of the same material laid in cement are as nearly indestructible by fire as anything that the ingenuity of man has invented. It was thought at first that iron buildings would be proof against fire; but the iron girders, beams, and posts, though they cannot be consumed, are so expanded and bent under the influence of heat as to be rendered useless for supports in time of a fire. No doubt a building may be so constructed that a fire in one of its rooms may destroy what is combustible therein, without going any further and without endangering the building itself; but if it is contiguous to other buildings in conflagration, its walls must be very hard and thick to resist the power of the flames, while they can hardly protect anything within that is combustible, for the fire will make its way through doors or windows, unless extraordinary precautions have been observed. Many brick walls fail to resist fire on account of defective mortar, which crumbles from heat, causing them to deflect and fall. Wood, well pugged with cement, is strongly recommended by many architects as preferable to iron for girders and beams, but unless the cement is of the best quality, it will afford little protection. In London, safety is sometimes sought in arrangements for flooding buildings with water through pipes constantly connected with a reservoir; but in many cases this would afford but slight protection. The system of pugging wood with cement for light structures is in common use in Paris. Oak timber, on account of its hardness, is chiefly used for this purpose. The framework, made in the ordinary way, is battened with oak inside and outside, the battens being only a few inches apart. The space between the two series of vertical battens is filled with burnt clay, chips of stone, or broken brick, and then the surface on each side is coated with plaster of Paris, completely filling the interstices, covering the wood, and making a hard, smooth wall, impervious to fire to a certain extent, but liable to crack and fall away under the influence of great and protracted heat. The ceilings and floors are also battened and protected in the same way. It is difficult to isolate the different stories of a building from each other on account of the openings for hoistways and stairways; but this has been effected in some cases—notably in that of the book-warehouse of Harper & Brothers in New York—by putting the stairways outside the walls. Mansard roofs have been made less dangerous by the use of iron instead of wood to support the slate. Floors now are sometimes made fire-proof by clay bedded upon a metal support. But none of these devices, nor any others thus far adopted, afford absolute protection, under all circumstances, against the invasions of fire.

FIRE-PROOFING. Attempts have continually been made to render cotton, linen, and other textile fabrics, timber, etc., incombustible; but at present they have been but partially successful. There are many means by which fabrics may be prevented from flaming, their combustion being reduced to a slow smoldering; and the many cases of fatal results from the extravagant dimensions of ladies' dresses (crinoline) rendered the adoption of some such protection against fire very desirable. By moistening the fabric with a solution of any saline substance, which, upon drying, will leave minute crystals deposited in or between the fibers, its inflammability will be greatly diminished, but the salt imparts a degree of harshness to the fabric, and in many cases weakens the fibers. Alum, sulphate of zinc, and sulphate of soda have been used, and are effectual to prevent flaming, but they weaken the fiber. Common salt does the same. Phosphate and sulphate of ammonia are less objectionable on this account, but the former decomposes by contact with the hot iron in ironing. Tungstate of soda has been proposed, and is said to have no injurious effect on the fiber. Sulphate of ammonia, chloride of ammonium (sal ammoniac), and borax, are among the best fitted for domestic use, though they are not unobjectionable. For made-up clothing, borax is, perhaps, the best, and it is most effectual in its action, and is the least injurious to the appearance of the article, though it is stated to have some weakening effect on the fiber; this, however, is only perceptible in case of a tearing strain, and will not perceptibly damage such articles as ladies' underclothing, or anything else only subject to ordinary wear. Wood has been treated in a similar manner. Milk of lime, alum, sal ammoniac, sulphate of ammonia, chloride and sulphate of zinc, sulphuret of lime and baryta, etc., have been used, and its *inflammability*, but not its *combustibility*, is destroyed. Like the fabrics, when similarly treated, wood smolders slowly. The most efficient protection to wood is silicate of soda. If planks of moderate thickness be brushed three or four times over, on each side with a strong solution, they are rendered almost incombustible; they will only burn when very intensely heated. The silicate fuses and forms a glass which envelops the surface, and even the internal

fibers of the wood, if it be sufficiently saturated, and thus seals it from the oxygen of the air.

FIRE-PROOF SAFES AND REPOSITORIES are used as receptacles for deeds, paper money, account books, and other valuables. They are now regular articles of commerce, and are to be found in almost every counting-house, lawyer's office, jeweler's or watchmaker's shop or warehouse, and are indispensable to banking and such-like establishments. Our forefathers used oaken chests secured with iron straps and studs for similar purposes. That which formerly contained the crown jewels of Scotland, and is still exhibited in Edinburgh castle, is a good example. Subsequently, iron chests made simply of stout cast or wrought iron were used. The modern safe has double walls and doors of stout iron plates, and the space between the plates is filled with some substance that shall resist the transmission of the heat, which would be readily conducted through solid iron. The materials used for these linings are very various—sand, dried clay, charcoal, ashes, bone-dust, alum, gypsum, etc. The safes of Messrs. S. Mordan & Co., which are largely used by bankers, are lined with a mixture of equal parts of sawdust and alum. Some makers include small vessels containing liquids; the vessels burst when heated, and the liquids exert some cooling effect. Alum acts in nearly the same manner. It contains 24 equivalents of water, or nearly half its weight. At 212°, ten equivalents are driven off in vapor; at 248°, ten more; and at 392°, the four remaining equivalents are volatilized. It is a mistake, however, to suppose that any of these linings can render such a safe really fire-proof; and this is admitted by the more scrupulous manufacturers, who carefully abstain from using the designation of "fire-proof," but apply that of "fire-resisting," which honestly describes all that they are capable of doing, as they may resist the action of fire for a considerable time; but whether or not their contents may be ultimately preserved from a fire, is simply a question of the duration and intensity of the heat to which they are exposed. Their great weight in some cases assists in preserving them, especially when on an upper floor, as such a safe would be the first thing to break through the burning joists and descend to the lower part of the building, where the fire is usually the most smothered. These safes are sometimes let into recesses of stout masonry, built on purpose, and protected by an additional double iron door. This, of course, adds greatly to their security. All such safes should of course be secured by the best locks that can be made, protected by every possible precaution against picking, blowing up by gunpowder, or other violence. See LOCK, and SAFES, FIRE-PROOF.

FIRE-PROOF SAFES AND REPOSITORIES (*ante*), receptacles for things of value, so constructed as to protect them from fire, even though the building in which they are should be utterly destroyed. Such a safe may be described as an iron strong-box, lined with some fire-resisting medium. It is claimed that the idea of such a structure originated in this country with Mr. James Conner, type-founder, of New York, somewhere about 1833, and that he carried it into effect by placing a safe lined with plaster of Paris in his office. His invention was not patented, however, neither was its value tested by fire, and it was thrown aside after a few years. In 1843, a Mr. Fitzgerald took out a patent for the same or a similar invention. Nine years before this, however, William Marr patented in England a method for constructing a fire-proof safe. In the space between the inner and outer walls of his structure, Marr placed sheets of mica pasted upon paper, and then packed the space full of either burnt clay and powdered charcoal, or powdered marble. Since 1843, both in this country and in England, the invention, in one form or another, has come into general use, and different inventors have busied themselves with improvements. Charles Chubb, of London, used baked wood-ashes for filling; Thomas Milner, of Liverpool, inclosed one, two, or more inner cases, with spaces between for some absorbent material, in which were placed vessels, pipes, or tubes filled with an alkaline solution, or any other matter evolving steam or moisture, to be discharged into the surrounding absorbent materials on exposure to heat or fire; other English inventors filled the inner spaces with ground alum, finely sifted, and finely pulverized gypsum, mixed together, heated to liquefaction, and forming when cool a brittle substance, which was comminuted into a fine powder; later still, another English inventor used powdered alum and sawdust for filling. The material upon which we must chiefly depend for making a safe fire-proof is water, so placed that it may be liberated as steam, since nothing can burn in a safe when its filling furnishes steam at 212° F. It is also important that the supply of steam may be continued through a protracted fire—that the material may retain its water until required by heat—and that in ordinary use the safe may be free from dampness. Safes have been built to contain pipes or cans full of water, to be set free on the melting of some easily fused metal. Substances which contain water in their chemical composition are more serviceable, alum being a notable example. Among materials used for filling safes are soap-stone, alum alone or with plaster, clay, or paper pulp, gypsum with copperas, or asbestos, tiles, raw cotton, sawdust and whiting, hydraulic cement, etc. Herring's safe is filled with double sulphate of lime, the residue of soda-water manufacture. It is dry and changeless at common temperature, but gives off carbonic acid at 1000° F., the temperature of red-hot iron. Plaster of Paris and alum

are also used for the water which they contain, and the filling, when heated, furnishes a compound of carbonic acid and steam.

FIRE-RAISING, in the law of Scotland, is the equivalent term for arson (q.v.) in England. If any part of a tenement, however small, has been set fire to willfully, this crime has been committed. It is quite indifferent where the fire has commenced, and the offense is frequently perpetrated by setting fire to furniture, or to other objects either within or without a house; but it is not regarded as completed, and is punished as a separate crime, of which we shall speak afterwards, unless the fire has communicated itself to some part of a building. If the fire originated in carelessness, however gross, it is not willful fire-raising, but a minor offense, punishable with fine and imprisonment. But if the intention was to injure the proprietor of a tenement by burning, not his house, but an object in its neighborhood—e. g., a haystack—and the fire was accidentally communicated to the house, the offense is the same as if the fire had been applied to the house directly. The infliction of capital punishment for the offense of fire-raising is now in desuetude. When a man burns his own house without endangering the life of any one, he has not committed the crime of fire-raising, but he may be punished criminally, if the act was done for the purpose of defrauding the insurers. Till recently, it was the rule in Scotland, that where fire was the result of inevitable accident, it freed a carrier or innkeeper from responsibility for any goods that were destroyed in his custody, unless where fraud or collusion could be shown; but the law in this respect has been altered by the mercantile law amendment act, 19 and 20 Vict. c. 60, which provides, s. 17, that after the passing of the act (1856), "All carriers for hire, of goods within Scotland, shall be liable to make good to the owner of such goods all losses arising from accidental fire while such goods were in the possession or custody of such carriers"—thus equalizing the law of Scotland with that of England.

Attempting to set fire to houses, crops, etc., is a distinct crime from arson (q.v.), or the actual destruction of property by fire. By 9 and 10 Vict. c. 5, it is enacted, that if any one shall attempt to set fire to a house, etc., with such intent that the offense, if committed, would be felony, and liable to be transported for life, he may be transported for 15 years (now penal servitude), or imprisoned for two years. The attempt to burn growing crops of corn, etc., is a felony by 7 and 8 Geo. IV. c. 30, and punishable by transportation for seven years, or by imprisonment. These offenses are also misdemeanors at common law. By 24 and 25 Vict. c. 97, s. 8, the attempt to set buildings on fire is punishable by penal servitude for fourteen years, or imprisonment for two years; if a male under 16, to be whipped.

In Scotland, an attempt to commit willful fire-raising is an offense at common law. It is not necessary to constitute this offense that the fire should have consumed any part of the building, etc. Furniture—as a mattress—partly consumed, a lighted peat thrust under a stack without igniting it, are sufficient to warrant a conviction. Inciting others to commit fire-raising is an indictable offense; and, in some old cases, persons have been punished for the mere threats to commit the offense, without being guilty of any overt act.

The English act 9 and 10 Vict. c. 25, declares that whoever shall maliciously, by the explosion of gunpowder or other explosive substance, destroy or damage any dwelling-house in which there is any person at the time, is guilty of felony, and shall be subjected to transportation for life, or not less than 15 years, or to an imprisonment not exceeding three years. Blowing up a building with intent to murder, and thereby endangering life, or casting upon any person any explosive or corrosive fluid whereby grievous bodily harm is occasioned him, and similar offenses, are declared subject to the same punishment. Attempting any of these offenses subjects the perpetrator to a minor punishment. The manufacturing or having in possession any explosive substance, or dangerous or noxious thing, or any machine or instrument for the purpose of commiting any of the above offenses, is a misdemeanor, liable to imprisonment not exceeding two years. Male offenders under 18 years of age, convicted under the act, may be whipped.

FIRE-SHIP, a vessel, usually an old one, filled with combustibles, sent in among a hostile squadron, and there fired, in the hope of destroying some of the ships, or at least of producing great confusion. Livy mentions the use of such by the Rhodians, B.C. 190; but among the first occasions in modern times when they are known to have been employed, were by the Dutch in the Scheldt during the war of independence in the Netherlands, and, shortly after, by the English in 1588, against the Spanish armada. The Chinese tried them against the British fleet before Canton in 1857, but unsuccessfully. The service of navigating one of these ships into the midst of an enemy, there firing it, and then attempting to escape, is always fraught with great risk of failure and disaster.

FIRE AND SWORD. By the law of Scotland, though decree may be given in a civil action against an absent defender, no criminal sentence can be pronounced unless the accused be present. But to resist a criminal citation, is to rebel against the law of the land, and in former times might be treated as treason. In this view, letters of *fire and sword* were occasionally issued by the privy council (Stair, iv. 89). These letters were directed to the sheriff of the county, authorizing him to call in the assistance of the

country, and to proceed to the extremities which the terrible words fire and sword indicate, should such proceedings be necessary for apprehending the accused party. Lord Stair describes this remedy as the "last legal execution, warranting all manner of force of arms that is competent in war." The same course might be resorted to where the decree of a court was resisted; and the object with which letters of fire and sword were more frequently issued than any other, was to enable the sheriff to dislodge refractory tenants who retained possession contrary to the order of the judge, or the diligence of the law. By the modern practice, the judge may, of course, always call in the aid of the military to apprehend an accused party, or to enforce a decree where the ordinary means have proved unavailing.

FIRE-WORKS. See PYROTECHNY.

FIRE-WORSHIPERS. See GUEBRES.

FIRISHTA, MOHAMMAD KASIM HINDU SHAH, a celebrated Persian historian, b. towards the end of the 16th c. (1570?), at Astrabad, on the Caspian sea. At a very early age, he went with his father (Gholam Ali Hindu Shah) to India, where we find him, when 12 years old, at Ahmednuggur, in the Deccan, sharing the instruction which the latter gave to prince Miran Hussein Nizam Shah. He afterwards became captain in the body-guard of Murteza Nizam Shah; and when this king was deposed by his own son, F.'s former fellow-student—who, in his own turn, was deposed and murdered in less than a twelvemonth afterwards—F. went to Bijapore (998 H., 1589 A.D.), where Ibrahim Adil Shah II., the reigning monarch, received him with great honor. He also appears to have conferred a military rank upon him, as, soon after his arrival, F. is mentioned as taking part in an action against Jumal Khan, in which he was wounded and taken prisoner, but ere-long he made his escape. His death is supposed to have taken place shortly after the year 1612. His great work is the *Tarikhi Firishta*, or History of the Mohammedan Power in India, which he finished in 1018 H. (1609 A.D.). Twenty years were spent in its preparation, and the number of books used for, and partly embodied in it—special histories of certain periods and provinces—amounts, according to F. himself (introduction), to 35; but 20 others besides these are quoted in the course of the work. It consists—besides a preamble or introduction on the Progress of Mohammedanism in India, and a final treatise on the geography and the climate of India—of 12 divisions, treating of the kings of Ghizni and Lahore, Delhi, the Deccan, Guzerat, Malwah, Candeish, Bengal and Behar, Mooltan, Scinde, Cashmere, Malabar, and of the saints of India. Written with an impartiality, simplicity, and clearness rare in an eastern work, this history has become a standard work on the subject, into which it was the first to enter at length. Single portions of it have been translated by Dow, Scott, Stewart, Anderson, etc.; but the whole work, edited first by J. Briggs (Bombay, 1831, fol. 2 vols.), was also translated by him (London, 1832, 8vo, 4 vols.). A fuller account of F.'s life and writings, by the same, will be found in the second volume of the Transactions of the Asiatic society.

FIRKIN (dim. from *four*, the fourth part of a barrel), an old measure of capacity containing nine gallons (old ale and beer measure). But previous to the year 1803 it had two values, being estimated at eight gallons in old ale measure, and at nine in old beer measure. The F. is equivalent to 9½ imperial gallons. See GALLON.

FIRKOWITSCH, ABRAHAM, 1786–1874; born in the Crimea, of Jewish parents. He became a thorough master of the Hebrew text of the Old Testament, and of many other works, turning his attention particularly to the literature of the Caraites, a religious sect among the Jews. He was instrumental in establishing a printing press for the Caraites of the Crimea, and the reproduction of ancient manuscripts and modern books. In his search for ancient documents, he penetrated the depths of remote Asia, finding many valuable papers not before known to exist, and unintelligible even to their possessors. He was indefatigable in his work, digging over old cellars and searching the nooks of ancient houses, and brought to the imperial library at St. Petersburg 1500 MSS., nearly all of great value.

FIR'LOT (according to Jamieson, from Ang.-Sax. *feorth* and *lot*, the fourth part), an old Scotch dry measure, of which there were four in a boll (q.v.). Though differing in value for different substances and places, its relation to the boll remained invariable. See PECK.

FIRM. See PARTNERSHIP.

FIRMAMENT, a word in use of old to signify the vault of heaven. The term found its way into English from the Vulgate, which renders the Septuagint *Stereoma*, and the Hebrew *Rakia*, by the Latin *Firmamentum* (Gen. i. 6). Rakia (from the verb *raka*, to beat or strike out) signifies whatever is expanded or stretched out, and was specially employed by the Hebrews to denote the hemisphere above the earth, compared (Exod. xxiv. 10) to a splendid and pellucid sapphire. Elsewhere (Ez. i. 22–26) it is spoken of as the "floor" on which the throne of the Most High is placed. Hence it follows that the notions of solidity and expansion were both contained in the Hebrew conception of the firmament. The blue ethereal sky was regarded as a solid crystal sphere, to which the stars were fixed (compare the *cælo affixa sidera* of Pliny, ii. 39 and xviii. 57), and which was constantly revolving, carrying them with it. This sphere or firmament

divided "the waters which were under the firmament from the waters which were above the firmament;" and the theory of the phenomena of rain, etc., was, that there were "windows in heaven"—i.e., in the firmament, through which, when opened, the waters that were above the firmament descended. "The same day were all the fountains of the great deep broken up, and the windows of heaven were opened," Gen. vii. 11. The view entertained by the Greeks, and other early nations, was essentially the same. In the progress of astronomical observations, it was found that many of the heavenly bodies had independent motions, inconsistent with the notion of their being fixed to one sphere or firmament. Then the number of crystalline spheres were indefinitely increased, each body that was clearly independent of the rest having one assigned to it, till a complex system was introduced, capable of being fully understood only by the philosophers who formed it. See PTOLEMAIC SYSTEM. It was long before men formed the idea of the possibility of a body being maintained in motion in space without a fixed support, and considering the number of phenomena of which the hypothesis of a crystalline firmament offered an apparent explanation, we must regard it as having been in its day a curious and ingenious speculation.

FIRMAN, a word of Persian origin, signifies an order, and is used by the Turks to denote any official decree emanating from the Ottoman porte. The right of signing any F. relating to affairs connected with his special department is exercised by every minister and member of the divan, but the office of placing at the head of the F. the *thograï*—a cipher containing the name of the sultan in interlaced letters, and which alone gives effect to the decree—is committed to the hands of a special minister, who is called *nichandji-effendi.* The name applied to such decrees as have been signed by the sultan himself is *hatti-sherif.* The name F. may also signify a more formal kind of Turkish passport, which can only be granted by the sultan or by a pasha.—A written permission to trade is called in India a firman.

FIRMINY, a t. of France, in the dep. of Loire, 6 m. s.w. from St. Etienne, with which it is connected by a branch railway. Near it are rich coal-mines. It is a place of much activity, and has manufactures of silk, glass, and hardwares. Ribbons and nails are among the articles of manufacture most largely produced. Much lamp-black is also made. Pop. '76, 10,101.

FIROLA, a genus of gasteropodous mollusks, of the order *heteropoda*, entirely destitute of shell—although there is a small branchial shell in the nearly allied genus *carinaria;* of a very elongated form, having the mouth situated at the extremity of a proboscis; tentacula wanting, or merely rudimentary; and generally remarkable for great transparency of substance, often enlivened with golden spots. They swim by means of the *foot,* which is compressed into a fin, are often to be seen at the surface of the water in calm weather, and are abundant in the warmer temperate and tropical seas. The oxygenation of the blood is supposed to take place in part through the delicate tissues, as there are no special breathing organs but a ciliated band.

FIROZPUR, or FEROZEPORE, a district in British India in the Lahore division of the lieutenant-governorship of the Punjab, on the river Sutlej; 2,740 sq.m.; pop. '68, 549,253; Mohammedans, 245,659; Hindus, 160,487. The productions are wheat, barley, millet, cotton, tobacco, etc. The Lahore and Ludiana road is the chief route of trade. The chief town is Firozpur, on an old bank of the Sutlej; pop. '68, 20,592. The city is surrounded by a low brick wall, and the main streets are well paved. It is also an important military station.

END OF VOLUME V.

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